Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

March, 1935

NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

TECHNICOAL PROCITE TREATED

Technicoal *increases* tensile strength as much as 60 pounds. Technicoal also *improves* the color. The secret lies in the procite treatment which completely eliminates sulphur and results in complete flux of all clinkering material.

This improved coal makes **STRONGER** *cement*

1 Less coal per barrel.
2 Lower grinding costs.
✓3 Greater tensile strength.
✓4 Better cement color.
5 Uniform operating conditions.
6 Uniform cement clinkers.
7 Shortened burning zone.
✓8 Lowered sulphur content.
9 Reduced kiln ring formation.
10 Maximum kiln operation.

Write for free booklet and complete information on this modern fuel for cement-making.

POWHATAN COAL also Procite Treated

★ Pages 17-23

TECHNICOAL SALES CORPORATION

Exclusive Sales Agents

1010 EUCLID AVENUE • CLEVELAND, OHIO

THIS IS NUMBER FOUR OF A SERIES OF TECHNICOAL ADVERTISEMENTS

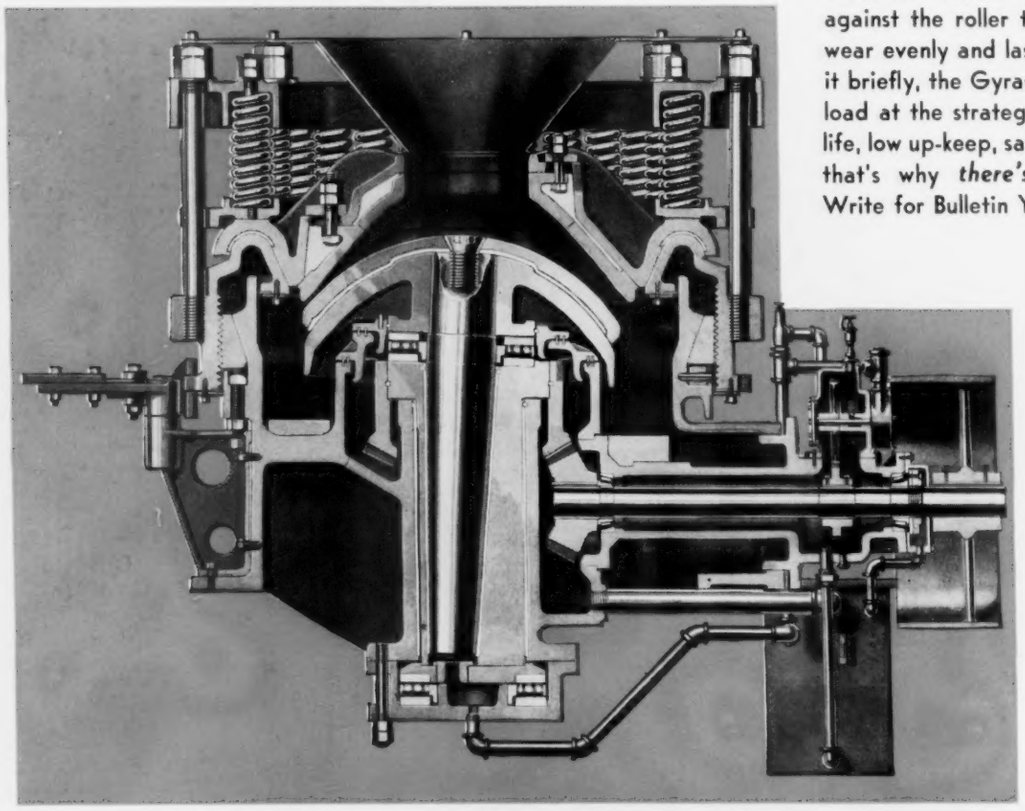
NO SHAFT BREAKAGE IN THE TELSMITH GYRASPHERE

Why!

There are two (2) reasons, *so plain and simple as to leave little room for argument or misunderstanding:—*

(1) Shaft breakages in spring-relief crushers are generally traceable to mis-alignment, caused by uneven wear of the bearings and the resulting shift of stresses to unexpected points on the shaft. Such mis-alignments do not occur in the Telsmith Gyrasphere. The head is supported on the eccentric, with a roller bearing between the two parts. The lower race rotates with the eccentric. The upper race creeps with the head. Between the two races, the rollers are constantly turning at the average speed of the two races. This rotation assures uniform distribution of wear on both rollers and races. The head support is always true—consequently the head and its dependent shaft are always in perfect alignment. That's Reason No. 1 why shaft breakages are most unusual.

(2) The second reason centers in the reduction of radial pressures. In other crushers having a gyratory head movement, a large part of the load is distributed laterally against the eccentric bearings. In a crusher of the spring-relief type, such lateral pressures cause the bronze eccentric sleeve to wear more rapidly at the top—to "bell-mouth," we call it. But, in the Telsmith Gyrasphere, the spherical shape of the head greatly reduces the lateral pressures. Most of the crushing load is taken off the bronze eccentric sleeves—diverted *downward* against the roller thrust bearings—which wear evenly and last indefinitely. To put it briefly, the Gyrasphere takes the heavy load at the strategic point, assuring long life, low up-keep, satisfactory service. And that's why *there's no shaft breakage.* Write for Bulletin Y-15.



TELSMITH

SMITH ENGINEERING WORKS

504 East Capitol Drive
Milwaukee,
Wisconsin

•

50 Church St.,
New York City

211 W. Wacker Drive,
Chicago, Ill.

130 S. 15th St.,
Philadelphia, Pa.

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Boston, Mass.

412 Westinghouse Bldg.,
Pittsburgh, Pa.

Thomas G. Abrams
Detroit, Mich.

LINK-BELT NEWS

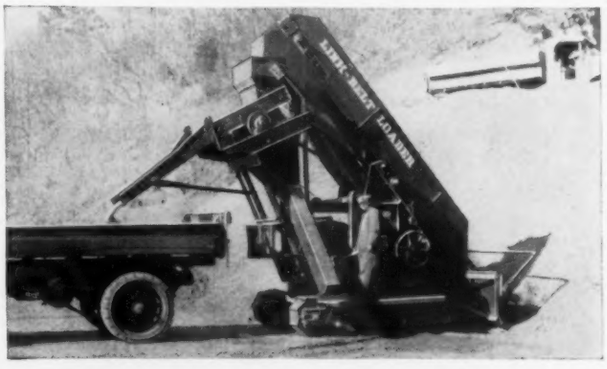
Devoted to Better Methods of Handling and Preparing Materials

SCREENING GRAVEL FOR FORT PECK DAM

Becker County—Shiely Co. have in service two Link-Belt portable gravel screening and loading plants for supplying gravel for the toe of this earth-filled dam now being built at Fort Peck, Montana. These unique plants each have a capacity of 550 tons per hour of pit-run material. The sand is screened out and returned to the pit, the boulders being loaded into trucks for disposal.

One of two car loads of Link-Belt "PD" type, heavy-duty vibrating screens, furnished for these plants, is shown.

CLEANING AND LOADING STONE WITH PORTABLE LOADER



R. K. Kibblehouse, who operates a quarry at Perkiomenville, Pa., solved the problem of cleaning stone in ground storage, before loading to trucks, by the simple expedient of installing this Link-Belt power-propelled "Grizzly" crawler loader, equipped with a Link-Belt vibrating screen.

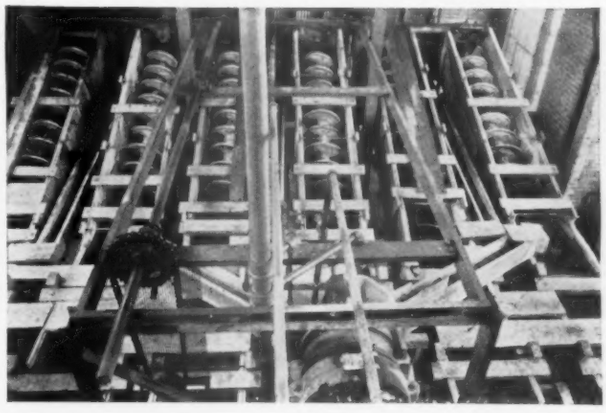
This high capacity unit feeds itself and is operated by one man. It crawls, as it digs, as it screens, as it loads. Trucks of 5-ton capacity are filled in 2 to 3 minutes with clean stone ready for transportation to points within the surrounding community.

RECOVERING PLACER GOLD FROM COLORADO'S FAMOUS CLEAR CREEK

The prospector of old who "panned" the streams of Colorado for "pay-dirt" is being considerably outdone by this modern placer gold recovery equipment. It is owned and operated by Humphreys Gold Corp. on Clear Creek, near Denver, the scene of much of Colorado's gold mining activity since 1858.

A Link-Belt K-38 shovel excavates to bed rock, and two Link-Belt draglines (a K-38 and K-48) deliver to the portable Link-Belt gravel screening stacker mounted on crawler treads. Note the large rocks in the foreground, which have been handled through the system.

WASHING INDUSTRIAL SAND FOR GLASS MANUFACTURE



Michigan Silica Company, of Rockwood, Michigan, are producers of high-grade silica sand which is suitable for optical use and plate glass manufacture. Among other equipment added to assure the purest product possible, were six Link-Belt screw-type sand-washers.

The material is crushed, and washed through several changes of water, the final operation being performed by these Link-Belt screw washers.

Send for Catalog No. 1240

LINK-BELT COMPANY

300 West Pershing Road, Chicago, or
2045 W. Hunting Park Ave., Philadelphia

Please send copy of your Catalog No. 1240.

Name .....

Firm .....

Address .....

City ..... State .....

Pit & Quarry 5238

MAY 25 1935
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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 27 March, 1935 Number 9

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1897.
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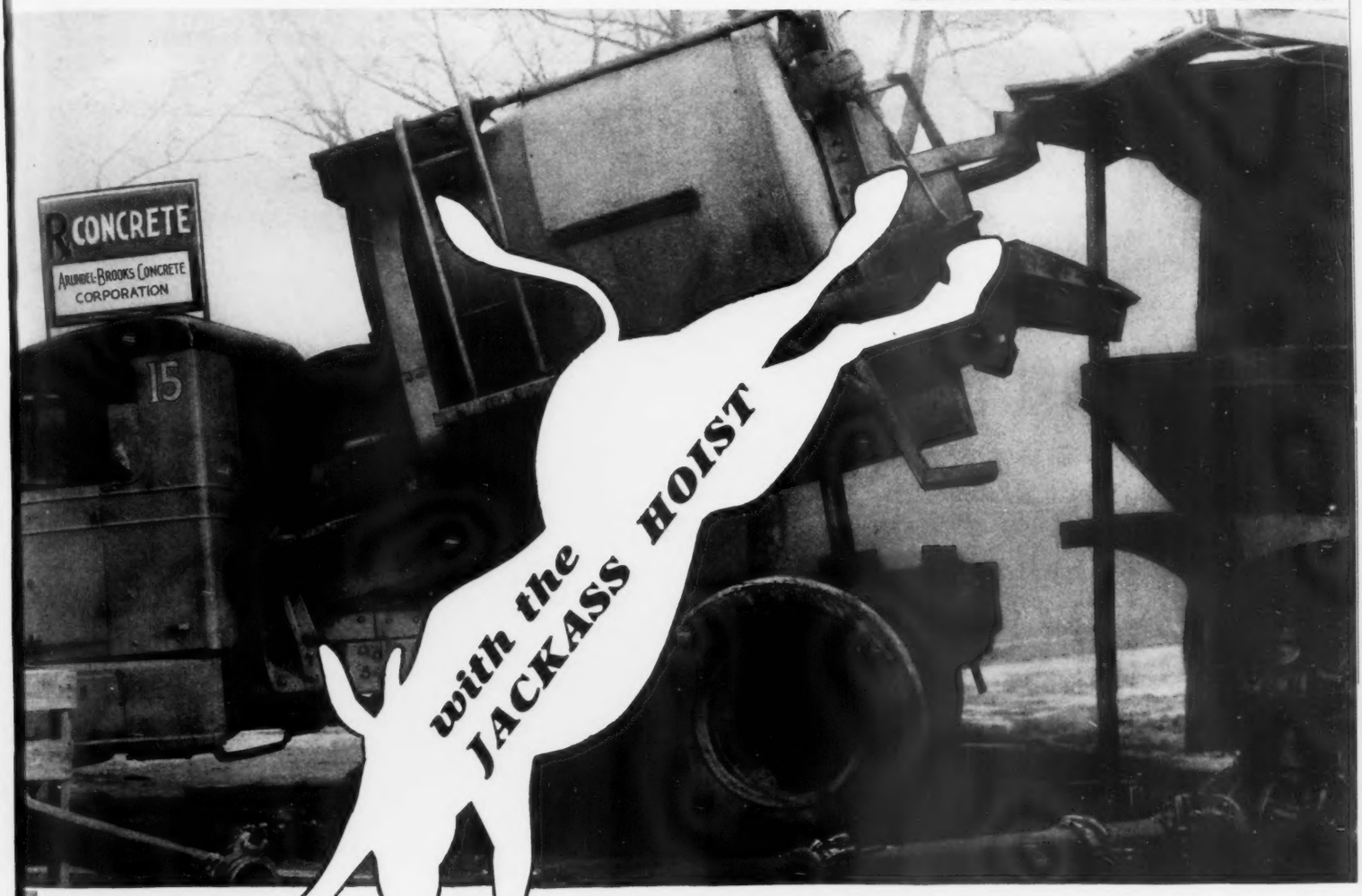
NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

THE NEW PROFITABLE WAY TO SELL SAND, GRAVEL AND STONE

USE REX MOTO-MIXERS
and AGITATORS



Rex Moto-Mixer feeding Rex Pumperete, which pumps concrete down 60 fee on Pennsylvania Railroad Union Tunnel at Baltimore, Maryland

To SELL THEM AS Ready-Mixed Concrete

Selling Ready-Mixed concrete is the easiest way to turn sand, gravel and stone into cash — at the same time building up a business that will insure a steady profit income.

Ready-Mixed concrete is in demand everywhere because it lowers the cost of construction. The Rex Moto-Mixer brings definite savings on practically every type of job where mixers and aggregates must otherwise be moved in.

More Pay Loads with Rex Moto-Mixers

You start faster with the pay load because the Rex Fast Charging Hatch means less Moto-Mixer time at the plant. You produce better concrete at lower costs because Rex Drum Design gives Rex Certified Concrete — Rex Moto-Mixer Design gives the Lightest Weight, the Lowest Center of Gravity, for lower fuel, truck and tire costs on the road. You cut placing time with the Rex Jackass Hoist and Jiffy Spout — 75% greater spouting range — back for more pay loads after the shortest possible time at the job.

CHAIN BELT COMPANY, MILWAUKEE, WIS.

Send for this New Book that Gives the Facts on Commercial Concrete

If you're even thinking about cashing in on the possibilities of commercial concrete business, send now for the new book "Mixing and Transporting Concrete With Rex Moto-Mixers and Agitators."

CHAIN BELT COMPANY
1646 West Bruce Street, Milwaukee, Wis.
Send the book on Mixing and Transporting Concrete.

Name .....

Firm .....

Street .....

City ..... State .....

CHAIN BELT COMPANY

They used to tear down drives low stretch and high flex life

BUT NOW YOU CAN MAKE THEM

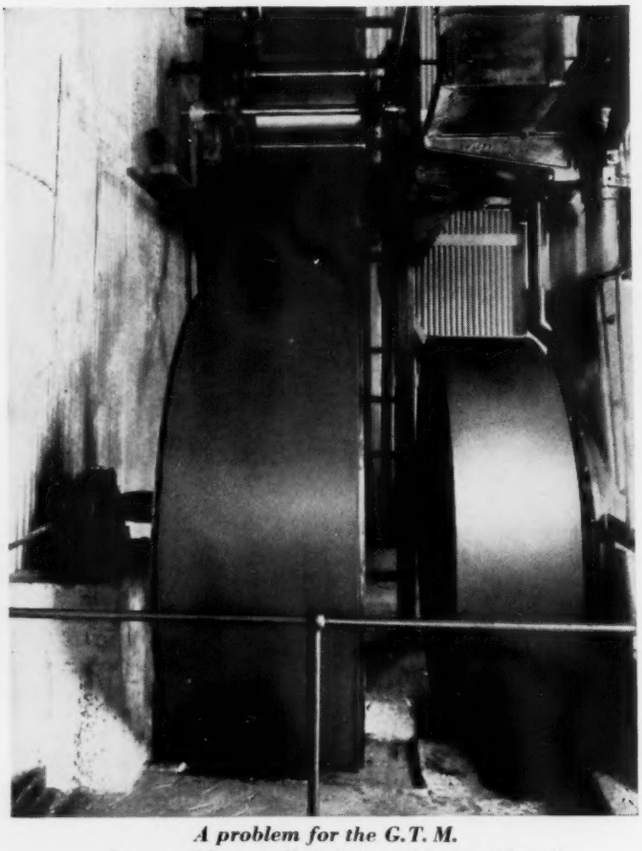
THE best proof of the savings and spectacular performance which Goodyear COMPASS Cord belts have been delivering is the trouble a wise man would take to install them.

Experience showed that—once installed—they outlasted other belts by as much as *ten to one.*

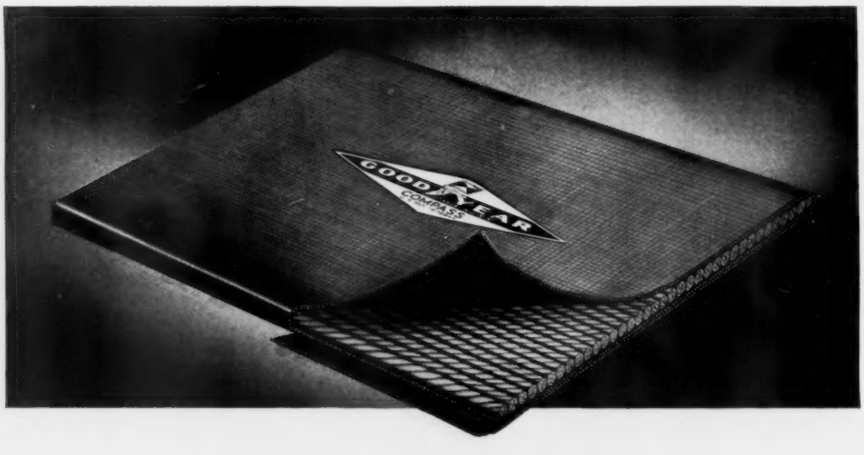
So, when necessary, plants tore down drives and tore out walls to put this money-saving belt on the job.

But the G. T. M. (Goodyear Technical Man) wasn't satisfied to let it go at that. There must be some way—he figured—to settle this difficulty—some way to install the belt so it wouldn't have to be tailor-made for every drive.

So he put the problem up to headquarters, and now we announce the answer—a *patented vulcanized splice*—with complete instructions and equipment for making these belts endless on the job.



A problem for the G.T.M.
—how could an endless *belt be installed here?*

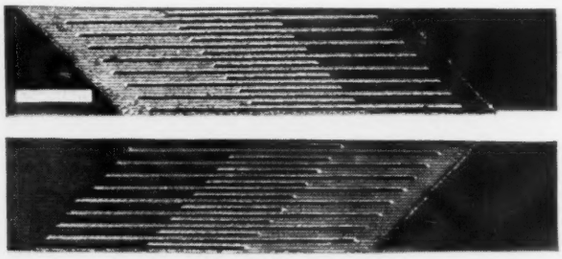


Simple, when you know how

How this is done—how cords can be dovetailed together—is shown by the diagrams pictured here. And the result—installed on the drive—is still an *endless* belt, with all the advantages which make the Goodyear COMPASS Cord belt *the first major improvement in belt design in fifty years.*

—even remodel walls to get the of Goodyear COMPASS CORD ENDLESS BELTS— ENDLESS RIGHT ON THE JOB!

It gets its long life and freedom from ply separation from the fact that it has *no load-carrying plies* to cause internal chafing at the pulleys. The load is carried by a single layer of cords or "ropes," laid side by side,



The Goodyear patented splice—notice how cords are dovetailed when ends are put together. No chance of splice failure here

"floated" in rubber, and sheathed in a protecting envelop built for *long wear.* This envelop is designed to stretch longitudinally, throwing the load on the cords.

In addition—this construction makes *the most nearly stretchless belt known.*

COMPASS Belts, so designed, are 25% thinner than belts of equal horsepower capacity—which means that they *stand up under flexing*—even on small pulley and reverse bend drives.

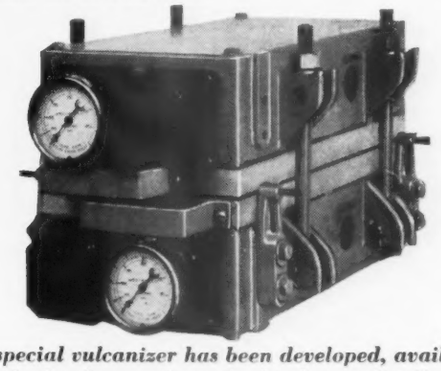
How COMPASS stands up

The case histories of this spliceless, plyless, long-lived belt include many such records as this:

"53 months unfaltering, trouble-free service on a pulp mill beater drive—*ten times the service of previous belts.*"

"Three years of stretchless, trouble-free service (and still going) on a drive where previous belts gave out at 19 months."

"33 months on an oil field pump drive—without service interruption—and still going strong. Previous belt broke five times in less than 5 months—total life only one-sixth the COMPASS belt record."



This special vulcanizer has been developed, available through Goodyear, through Goodyear distributors, or it can be purchased by customers for their own use

Such advantages are available on any drive, now that COMPASS Belts can be made endless on the job.

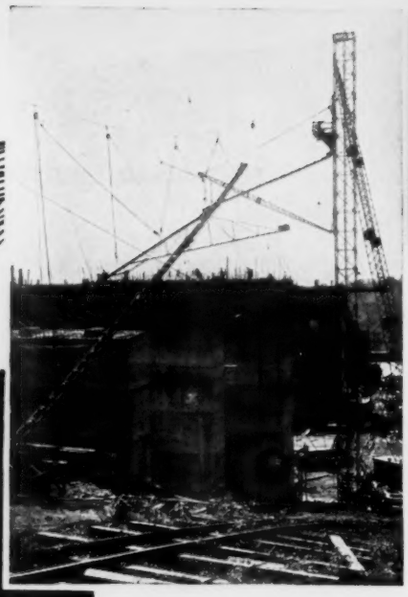
Why not have a talk with the G.T.M.? Just write to Goodyear, Akron, Ohio, or Los Angeles, Calif., or call your nearest Goodyear Mechanical Rubber Goods Distributor.

GOODYEAR

BELTS • MOLDED GOODS • HOSE • PACKING

Let's Get Together

and study with you

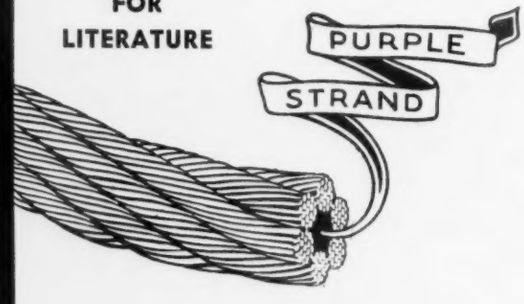


YOUR WIRE ROPE PROBLEMS

By reason of the vast technical experience we have compiled in relation to the use of ropes of proper construction in various operations, we may be of great help to you in the economical operation of equipment that may now be causing you trouble and excessive expense.

This Photo shows one of our PRE-STRETCH-ING Methods

WRITE FOR LITERATURE

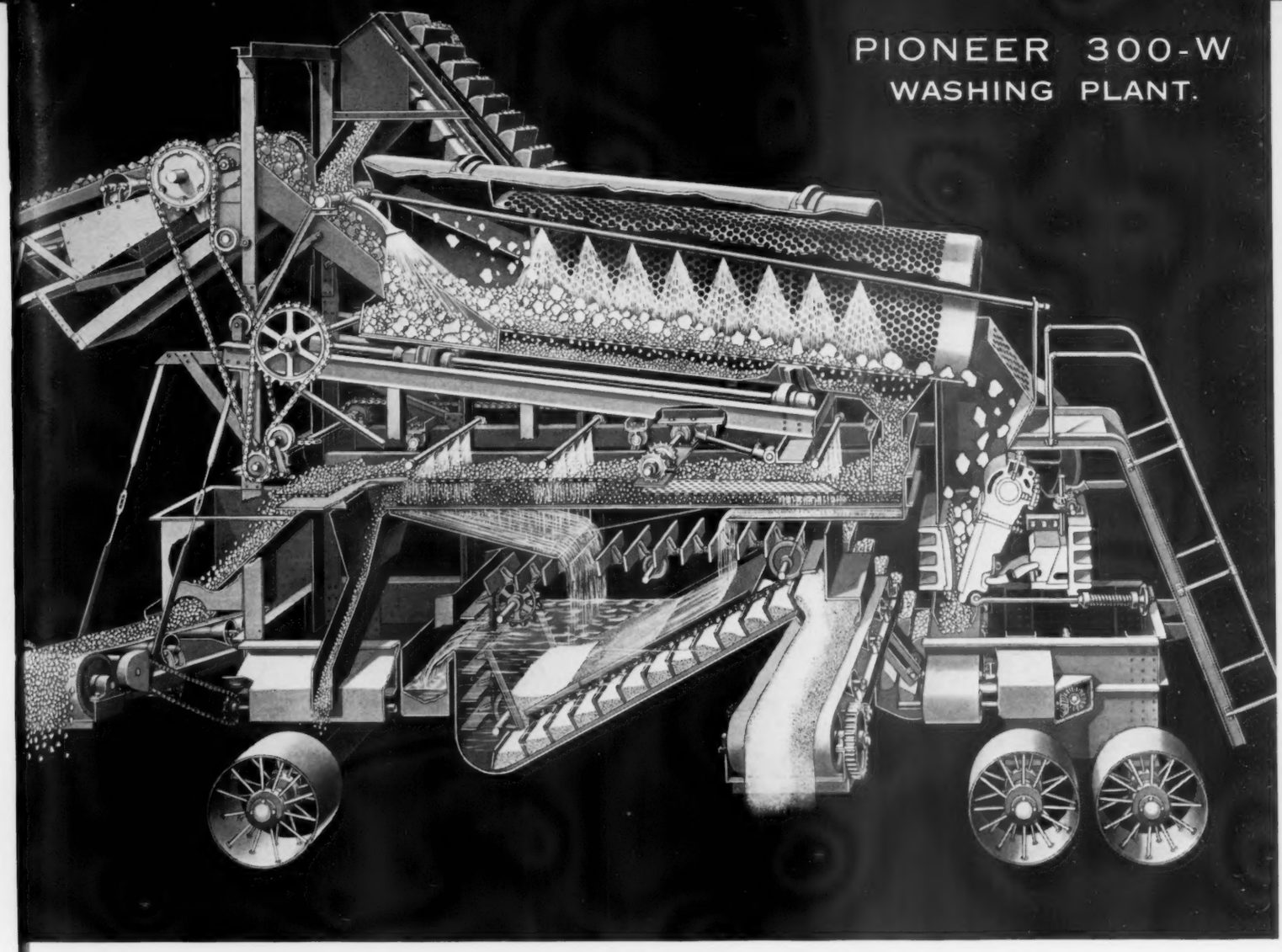


Williamsport

WIRE ROPE COMPANY

Main Office and Works: Williamsport, Penna.

Branch Sales Office: 122 S. Michigan Ave., Chicago



Do You Have to Meet Portable Competition?

You can profitably meet portable competition by using Pioneer Portable Equipment. The Pioneer 300-W Washing Plant is the answer to the producer's problem. It will crush, screen, wash, and produce sand and three sizes of coarse aggregate simultaneously. It requires only suitable gravel and water supply. The capacity will meet the requirements of the modern paver. Strict tolerances are met by using the Pioneer Horizontal Shaker Screen.

Don't experiment—buy the factory designed and built Plant—it's complete—compact—fully anti-friction bearing—and it is tried and proven in the field.

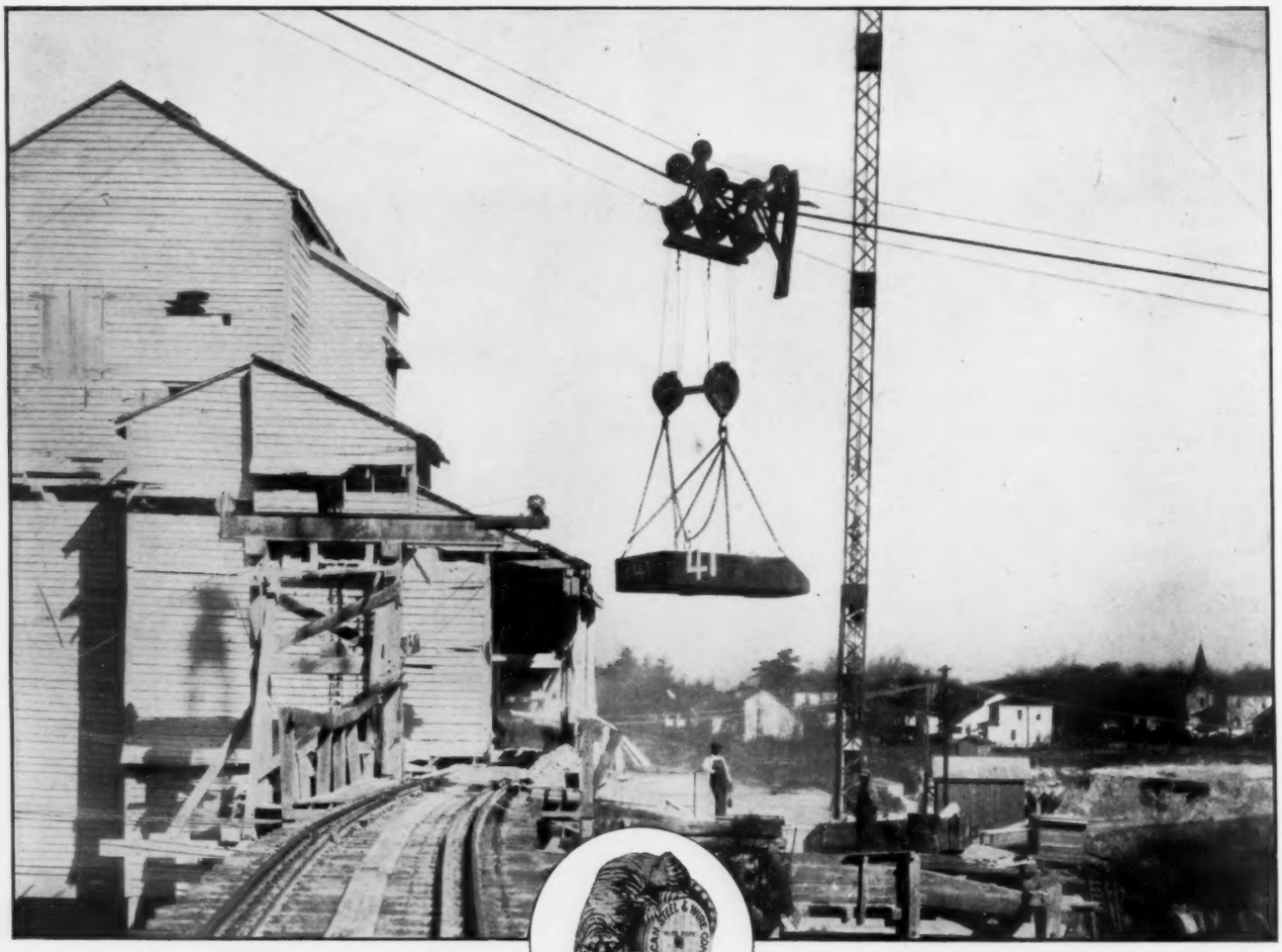
Write right now for full information to:

PIONEER GRAVEL EQUIPMENT MFG. CO.

1523 Central Ave. **Minneapolis, Minnesota**

Highways Material Co. of Chicago, Ill., operating a 300-W Pioneer Washing Plant in a gravel pit near Lena, Illinois. On this job coarse aggregate and sand were produced in accordance with Illinois specifications, which require rejection of excess pea gravel. Plant produced ample tonnage to take care of requirements of 27E Paver.

IN PIT—IN AIR —ON SURFACE—



The TIGER TRADE MARK is a symbol of Strength and Dependability
THE MARK FOR GENUINE AMERICAN WIRE ROPE

Wherever earth is moved . . . . . Wherever hard rope jobs exist,
Wherever delays may be costly . . . And long rope-life is necessary

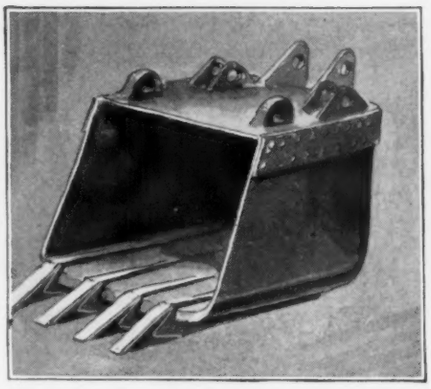
YOU will find it worth your time to allow our engineers to work with you in planning and supplying your wire rope needs. For different jobs—different ropes—but all carefully engineered to give service beyond their price.

AMERICAN STEEL & WIRE COMPANY

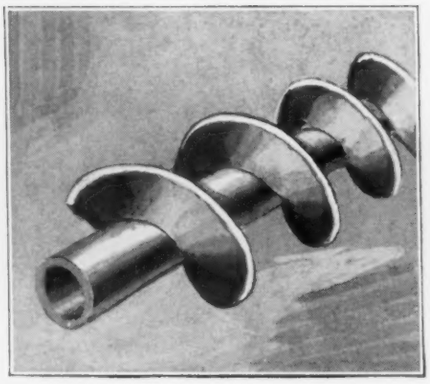
208 SOUTH LA SALLE STREET • • CHICAGO

Offices in All Principal Cities

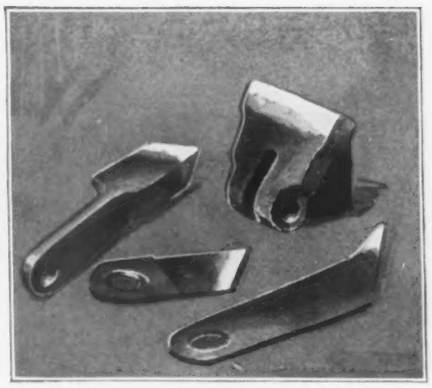
United States Steel Corporation Subsidiary



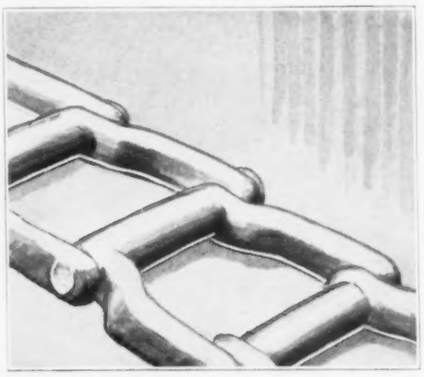
Hard-faced with AMSCO No. 459 Welding Rod, Dipper Teeth last many times longer.



Screw Conveyor Edges, hard-faced with AMSCO No. 459 Welding Rod, many times return their cost.



AMSCO No. 459 Welding Rod is ideally applied to pulverizer hammers of every type.



Drag Chains and Conveyor Flights have a vastly greater life when hard-faced with AMSCO No. 459

AMSCO No. 217, a new hard facing rod, differs from AMSCO No. 459 in giving a much harder deposit although one not quite so tough. Use AMSCO No. 217 for maximum abrasion resistance where no great impact is involved.

AMSCO No. 459 *WELDING ROD* FOR HARD FACING..

Industry has learned the value of hard-facing and is rapidly learning the value of using AMSCO No. 459 Hard-Facing Welding Rod for this work.

AMSCO No. 459 Hard-Facing Rod on tests and during six years of field application has proved its superiority by outwearing by 40% other materials costing twice as much. 200% to 300% greater returns on welding rod investment are being made.

Use AMSCO No. 459 Welding Rod on your work. The exclusive characteristics are:

1. Easy to apply with torch—in coated form, with electric arc.
2. Welds with equal facility to manganese or carbon steel and other ferrous metals.
3. Much tougher than other hard-facing materials with comparable abrasion resistance, does not crack, chip or spall off.
4. Being iron base, it fuses readily with iron or steel parts and is better adapted to the work than hard-facing containing no iron.
5. Its qualities of adhesion and toughness are not lessened by heat treating.
6. Presents outstanding resistance to wear and abrasion, even under impact.
7. Costs much less than comparable materials.

Try AMSCO No. 459 Hard-Facing Rod on your next job. Pug Mill Knives, Plow Shares, Dipper Teeth, Drag Chains, Crusher Parts, Tractor and Road Machinery Parts, Screw Conveyors, Pusher Shoes and hundreds of other machine and equipment parts are readily salvaged by hard surfacing with AMSCO No. 459 Welding Rod.

If you have never used it—send for free samples, instructions and literature.

AMSCO

TRADE MARK REGISTERED

AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

396 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities.

WHAT DO YOU MEAN • • *More Work?*

Just that! With Cordeau-Bickford Detonating Fuse each cartridge has the added force of a primer cartridge—"goes" with its maximum force—does more work. This is because the Cordeau is in intimate contact with all the cartridges in a hole and acts as an individual detonator for each.

You can use fewer but larger shots—drill all the holes at one time, hook up with Cordeau and fire them all at the same time. Shots can be planned to give a maximum amount of rock through successive relief of burden.

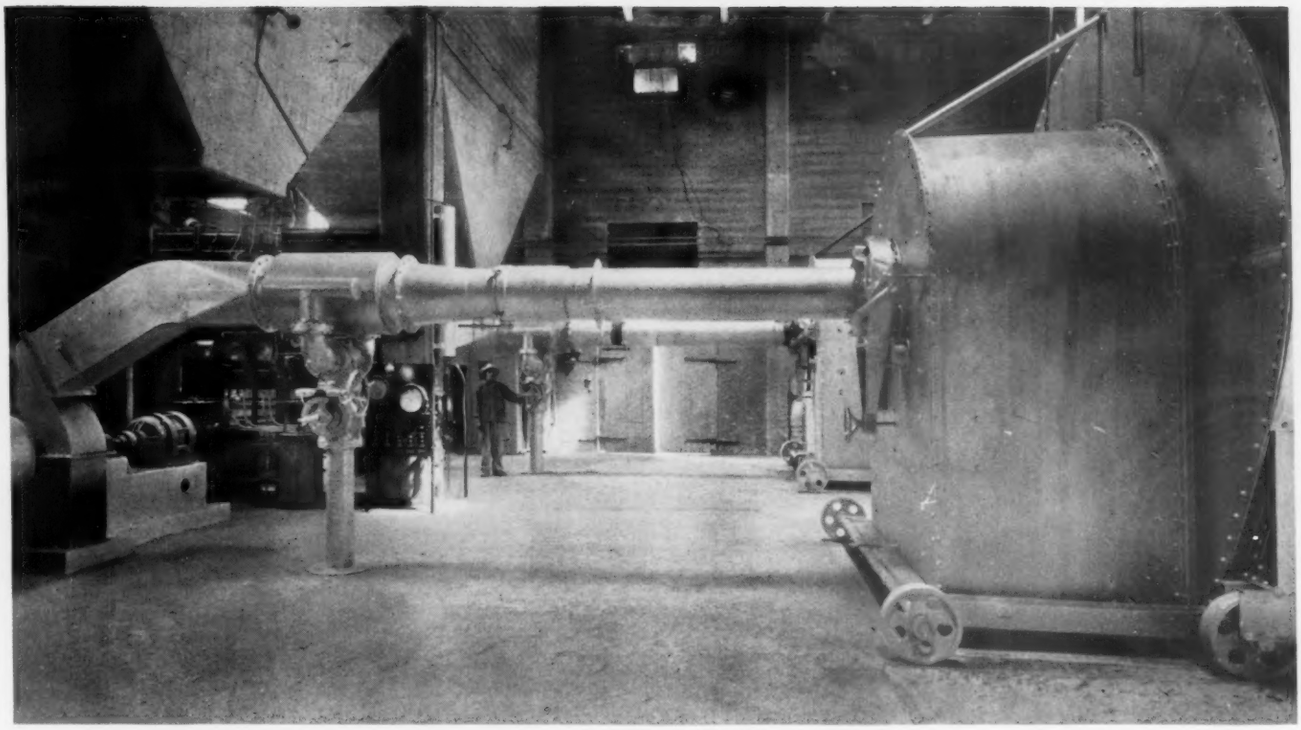
Thus Cordeau not only results in *more work*, but its use generally means better fragmentation, easier removal.

But *more work* is only one way in which Cordeau pays. Learn the others! Watch succeeding advertisements or write to us. THE ENSIGN-BICKFORD COMPANY, Simsbury, Connecticut. *Estab. 1836*

CORDEAU
DETONATING FUSE
BICKFORD
ALSO SAFETY FUSE *Since* 1836

THE ENSIGN-BICKFORD COMPANY

CB-40



Oklahoma Portland Cement Co. has cut cost of fuel per barrel, increased kiln capacity and secured a klinker of greater grindability as a result of combustion changes recommended by our engineers.

When your Directors meet, they want to know about

PROFITS

—and profits are made—or lost—in the kiln. Every B.T.U. wastefully dissipated adds to loss—every B.T.U. recaptured and made to work increases profit. These are days when production costs MUST be cut. If a modest capital investment will plug a leak—will increase kiln efficiency—the balance sheet benefits—the directors applaud keen management.

To these ends we offer a reliable, experienced

Combustion Engineering Service

As we have done in other plants, we can in yours provide a means for recovering clinker heat, returning it to the combustion zone of the kiln in a manner that allows it to work efficiently. You can cut your fuel cost, get larger kiln production—and klinker grinding costs will go down too. Will you let our engineers consult with yours? You will incur no obligation.

Cement Mill Equipment Company

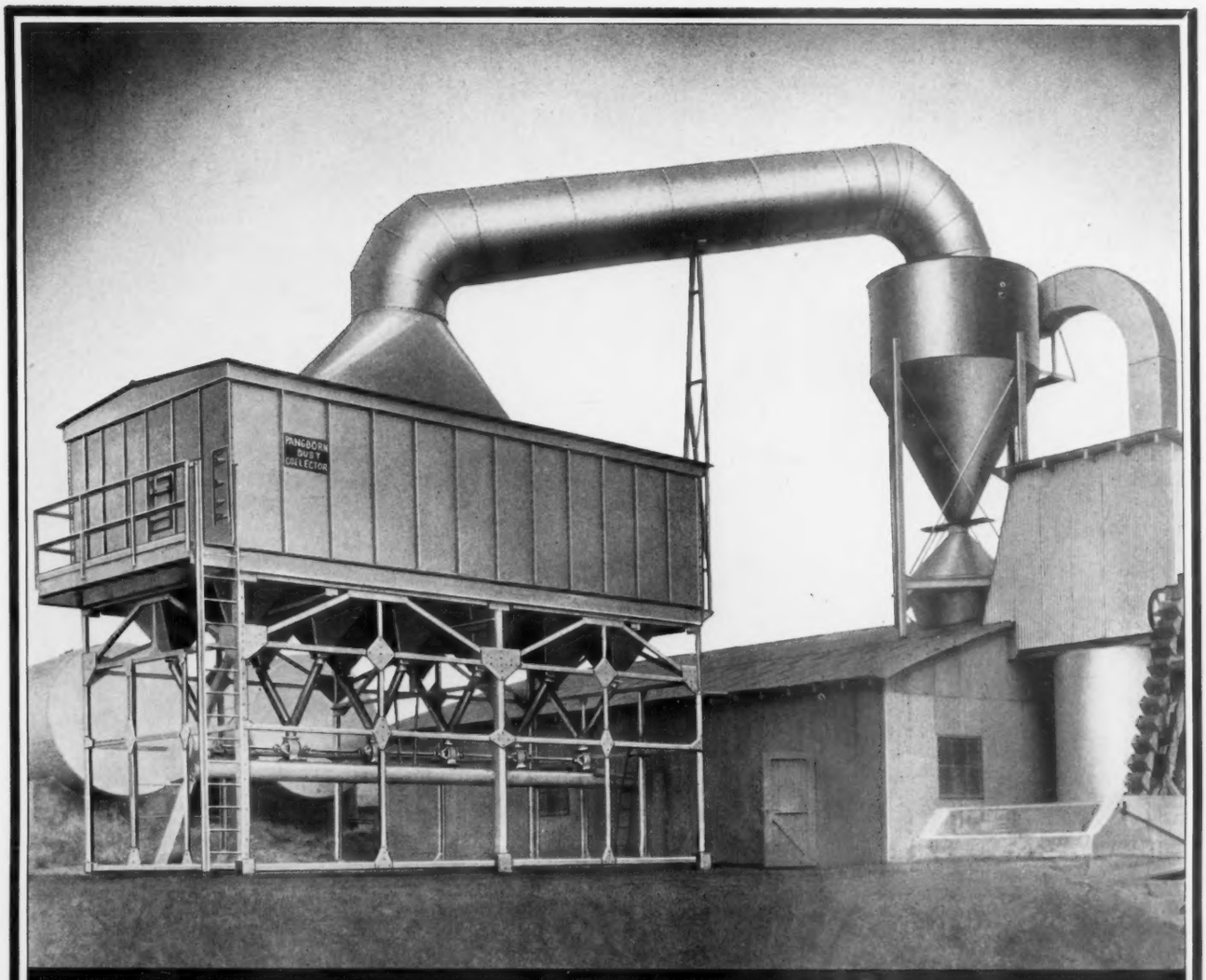
2842 West Grand Blvd., Detroit, Michigan

AT THE BONNEVILLE DAM •

IT'S A PLYMOUTH!

In 1928 General Construction Company bought two Plymouth Locomotives for the Owyhee Dam contract. Today these same two Plymouths are being used in the construction of the power house and navigation locks at Bonneville Dam. General Construction Company and J. F. Shea are the contractors. Let Plymouth handle your haulage jobs. They'll do it economically and give you long years of faithful service.

PLYMOUTH LOCOMOTIVE WORKS, PLYMOUTH, OHIO, U. S. A.



A PANGBORN "ROCK PROCESSING INDUSTRY" DUST COLLECTOR

• THE INCREASING DUST THREAT •

DUST threatens the very existence of your business. Rock processing operators are learning this by costly experience through working conditions hazardous to health, through excessive building and equipment maintenance, through loss of valuable salvage material, and, last but not least, through being a nuisance to surrounding property owners.

These threats can be radically reduced. Many have availed themselves of the extensive experience offered by Pangborn in designing, manufacturing, testing and servicing all classes of Dust Collecting Systems in the past 30 years. Pangborn helps both large and small plants to control dust. We will gladly tell you about it and assist you in making a practical study of your dust threat. This Pangborn Service is given without obligation.

Write to P. O. Box 8504 for free Bulletins describing Pangborn Dust Collectors.

QUALITY PC PRODUCT

SINCE 1904

PANGBORN CORPORATION

The World's Largest Manufacturers of Dust Collecting and Blast Cleaning Equipment

HAGERSTOWN · · · MARYLAND

Better Than New!

Worn Out Castings—rebuilt to last longer than originals—and cost less

CRUSHER HEADS

Chilled-iron crusher heads rebuilt with our nickel-manganese cost less than new iron heads, saving the removing of the shaft and shipping. They will give service equal to that of new manganese head castings and many times that of iron heads.

SEND FOR BULLETIN

MAKE your repairs show a profit!

Use the McLean Process of rebuilding old, worn-out parts so that they will actually give you from TWO to FOUR times longer service than when new.

This method is gaining the attention of all industry, as a means of reducing replacement costs, and restoring equipment to useful and efficient service.

In the McLean Process, the rebuilt portion, built up from nickel-manganese steel, is thoroughly work hardened to a maximum before the hard surfacing is applied.

Then the toughened base metal is hard surfaced with wear-resisting alloy steel, producing a super-tough tool-steel working edge or surface.

CONVENIENT SERVICE

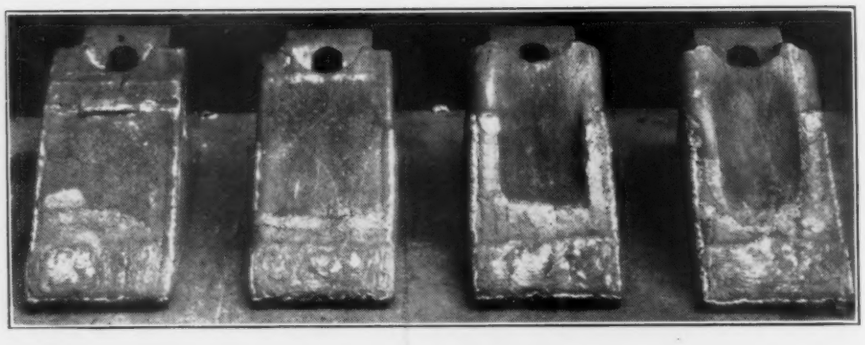
For rebuilding heavy equipment that is costly to remove, we can do the job right in your own plant, saving you the expense of difficult handling and shipping.

Light work, like dipper teeth or small pump shells, you can send direct to our factory, where it can be quickly rebuilt and returned at reasonable cost.

Let us quote you on special requirements. We apply hard facing and wear resisting alloys to meet your repair needs on all types of pump shells, dipper teeth, crusher heads and hundreds of other items of equipment. McLean rebuilt work costs less and lasts longer than new parts.

PUMP SHELLS

Worn out pump shells can be rebuilt and work hardened for about half the cost of new ones—and you get from 25% to 50% longer service.



DIPPER TEETH

SPECIAL OFFER

We will rebuild, work-harden and hard-surface any worn-out set of manganese dipper teeth, including freight both ways, for the same cost as a new set, to prove to you that our rebuilt teeth will outwear new ones two to three times, thus saving you time and money.

McLean Welded Products Corp.

WELDING ENGINEERS AND CONTRACTORS

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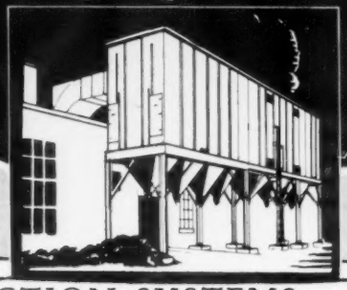
Install BLAW-KNOX DUST COLLECTORS to avoid the *menace* of SILICOSIS and other industrial diseases

Write for particulars



Blaw-Knox DUST COLLECTION SYSTEMS are used by these Industries:

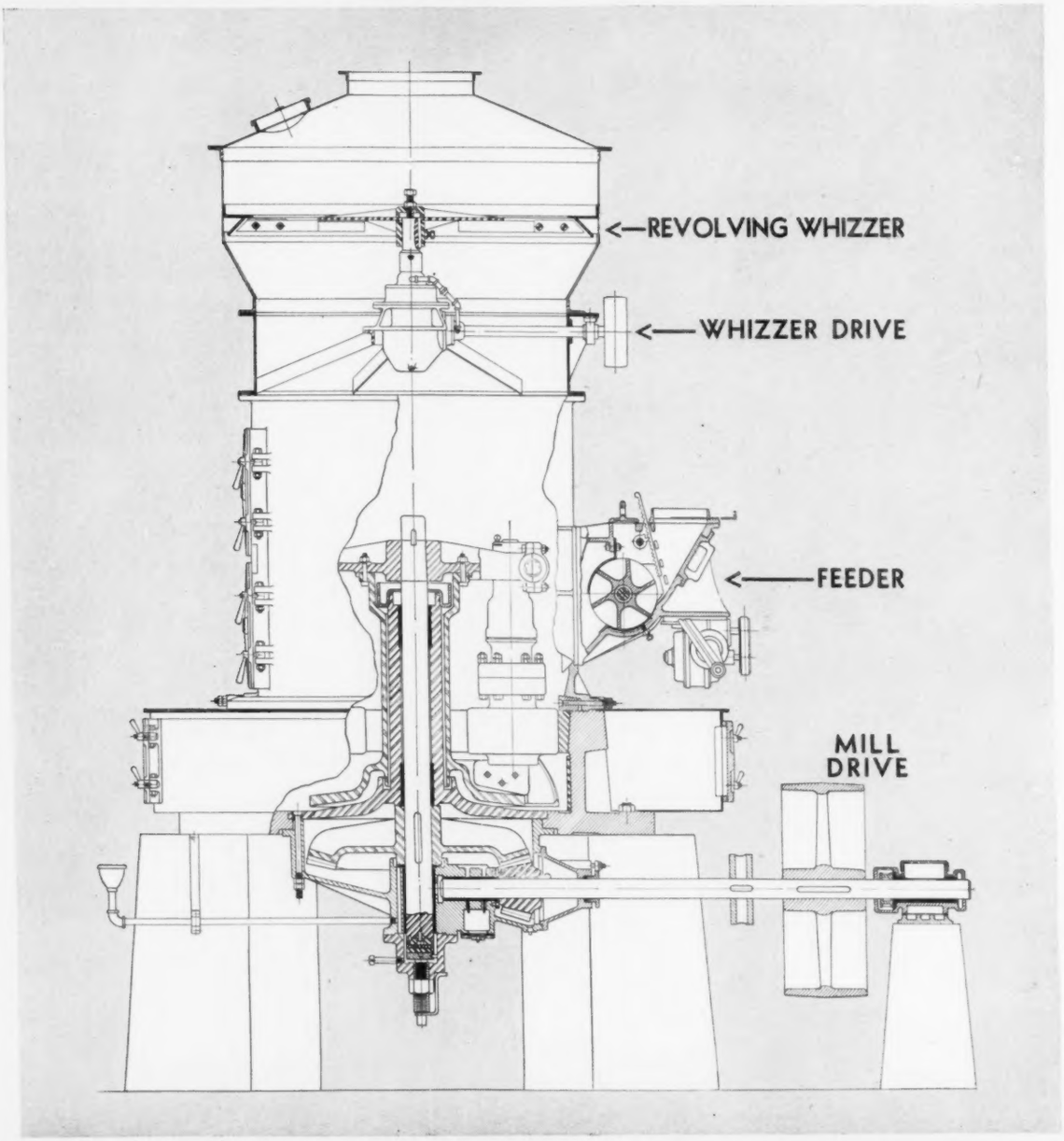
Aluminum	Asbestos	Talc	Chemical	Automotive
Steel	Asphalt	Foundries	Dyes	Brewing
Flour	Glass	Lime	Abrasives	Cleaning
Insulation	Rubber	Pigments	Paper	Machine Shops
Coal	Cement	Tin	Cocoa	Metallurgical

BLAW-KNOX COMPANY

Farmers Bank Building **Pittsburgh, Pa.**

Offices and Representatives in Principal Cities

Fineness—under instant control



ROLLER MILL WITH WHIZZER

RAYMOND now offers a combination unit, giving a wide range of classification from about 80% through 100-mesh up to 99.95% passing 325-mesh. The changes in fineness can be made instantly, by means of a variable transmission connecting motor drive with the whizzer. This special application of the whizzer mechanism—first patented and used in the Mechanical Air Separator—is the latest important development in roller mill equipment. Output nearly doubled by substituting Whizzer-equipped Roller Mills in recent installations. Get the facts about this economical method.

RAYMOND BROS. IMPACT PULVERIZER CO., 1321 No. Branch Street, CHICAGO. Sales Offices: In New York and Los Angeles.

Canadian Representative: Combustion Engineering Corp. Ltd., Montreal

Since 1887

RAYMOND

Write for BULLETIN: "Roller Mills with Whizzers"

PULVERIZING, SEPARATING, AIR DRYING AND DUST COLLECTING EQUIPMENT

VOLUME 27 NUMBER 9

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, MARCH, 1935

Cement Plants Reopen After Winter Shutdown

SEASONAL SLUMP ENDING EARLY

The resumption of production in the cement industry is beginning early this year with many plants now operating or planning to begin operations shortly. Among those scheduled to resume operations on April 1 are the Lone Star Cement Co., Hudson, N. Y.; the Universal Atlas Cement Co., Hudson, N. Y.; and the Alpha Portland Cement Co., Ironton, O. Among the plants resuming operations in February were those of the Lehigh Portland Cement Co., Birmingham, Ala., and the Alpha Portland Cement Co., at Birmingham, Ala., and Manheim, W. Va.

Ohio Cement Plant to Install Slurry Filters

★ The Wabash Portland Cement Co., Osborn, O., has purchased two Oliver United Filters, Inc., American-type filters for its two newest kilns which are 11 ft. 3 in. in diameter by 175 ft. long. Each filter unit consists of 6 disks and the installation is expected to be completed by May 1.

Western Lime Works Forms Own Sales Organization

The Western Lime Works, Ste. Genevieve, Mo., announces that former sales connections with the Ste. Genevieve Lime Co. have been discontinued and that future marketing activities will be conducted by the Western Lime Works through its own sales organization with headquarters at Ste. Genevieve. The Cardinal, a symbol of excellence, has been chosen to identify the company's products and will be used as a trade-mark on all future shipments.

Sixth Safety Trophy Won by Duluth Cement Plant

Award of the Portland Cement Association safety trophy to the Universal Atlas Cement Co. in Duluth, Minn., has been announced by R. S. Huey, superintendent of the plant. The plant in New Duluth on Jan. 1 had completed 1,452 days without a lost-time accident. A. S. Hetherington is supervisor of safety and labor at the plant.

The Duluth plant a subsidiary of the United States Steel Corp., also won the award in 1925, 1927, 1929, 1932 and 1933. In announcing receipt of the award, Mr. Huey paid high tribute to employees of the firm for their interest and coöperation in the safety program.

Cementos Mexicanos to Produce White Cement

★ Cementos Mexicanos, S.A., Monterrey, Mexico, are reported to be progressing with the installation of equipment for the production of white cement. Additional storage capacity will also be built.

West Virginia Dam Cement Contracts Let

Contracts were awarded Feb. 21 for 1,200,000 bbl. of cement for the construction of the Tygart reservoir dam near Grafton, W. Va. The Alpha Portland Cement Co., Easton, Pa., was awarded 600,000 bbl. and the remaining 600,000 bbl. were divided equally between the Bessemer Limestone & Cement Co., Youngstown, O., and the Medusa Portland Cement Co., Cleveland, O. The latter two awards were said to have been made by drawing lots from among the ten other companies which submitted bids. All bids were at the rate of $1.70 per bbl.

Ohio Company Building New Rock Asphalt Plant

★ The Ohio Asphaltic Limestone Co. was recently formed with offices in the Neil House, Columbus, O. The quarries are located in Highland County near New Vienna, O., and a reduction plant is at Willitsville. A new plant is now under construction at New Vienna where a new asphalt rock quarry will be opened. Owners of the company are S. F. Ferguson, formerly chief engineer for the Kentucky Rock Asphalt Co., and Neil and John Cashman.

★ The Pretoria Cement Co., South Africa, has purchased Oliver American-type filters for its plant.

Repair, Improvement Permits Show Increase

VALUE 51 PER CENT. OVER 1935

The total number of repair and improvement permits issued during the year 1934 in more than 750 cities having populations of more than 10,000 each was found to have been 24 per cent. greater than the total granted for these purposes in the same cities in 1933. The amount of money involved in the 1934 volume of permits was 51 per cent. over the value of the previous year's total, according to information made available by the Bureau of Labor Statistics, U. S. Dept. of Labor. Inasmuch as there are only 982 cities having populations of 10,000 or more in the entire country these gains noted may be taken as indications of the increase throughout the Nation last year.

The effect of the operation of the Federal Housing Administration's Modernization Credit Plan is indicated by a study of the individual monthly totals. After July, when the financial institutions commenced making credit available to owners for repair and modernization of their property the volume of permits issued showed large gains. As the Better Housing Programs got under way through the fall and early winter, totals became greater, despite the fact that it was during the so-called "unseasonal" time of the year.

Republic Is Authorized to Produce Velo Cement

It is announced that the Republic Portland Cement Co., San Antonio, Tex., has been authorized to manufacture Velo high-early strength Portland cement. This cement will be marketed under the trade name of Longhorn Velo.

★ The New Castle Lime & Stone Co., New Castle, Pa., is reported to be starting a $15,000 improvement program which will include the installation of new crushing equipment.

★ The Keystone Gravel Co., Dayton, O., has installed a 3 by 6-ft., triple-deck Deister vibrating screen and a 16-in. New Holland roll crusher.

Discuss Many Subjects at 31st A.C.I. Meeting

BEST PAPERS AWARDED MEDALS

The thirty-first annual meeting of the American Concrete Institute was held Feb. 19 to 21 at the Roosevelt Hotel, New York City. As usual the papers presented covered a wide and interesting variety of subject matter. At the annual dinner the Wason Medal for the best paper on "Cement Investigation of Boulder Dam with Results Up to the Age of One Year" went to Raymond E. Davis, Roy W. Carlson, C. E. Troxell and J. W. Kelly, all of the staff of the University of California. This paper was a progress report in reference to tests of 17 blending materials, 6 Portland cements and 82 blended cements, with reference to 14 properties among which the following are considered most significant: Grindability of cement; tensile and compressive strength of standard mortar; compressive strength of plastic mortar and concretes; heat of hydration and strength-heat ratio; volume changes of mortar; resistance of mortars and neat pastes to sulphate waters.

The Wason Medal for research was awarded to A. G. Timms and N. H. Withey for their paper on "Temperature Effects on Compressive Strength of Concrete." P. H. Bates, chief, clay and silicate products division, National Bureau of Standards, presented a paper on "Trends in the Production and Use of Various Types of Hydraulic Cements," in which he discussed the demands which service conditions are making upon cement and suggested how these demands must be met by various types of cement.

New Plant to Be Built by Kentucky Producer

★ The Caldwell Stone Co., Danville, Ky., recently announced the purchase of a quarry on the Kentucky River one mile south of Boonesboro bathing beach in Clark county. According to Robert Gwinn, vice-president of the company, a $30,000 improvement program will start shortly at this plant.

Annual Code Meeting of Region 8 Well Attended

The annual meeting for the producers in Region 8 (Ohio) under the code of fair competition for the crushed stone, sand and gravel and slag industries was held February 7 at the Deshler hotel, Columbus, O., with approximately 100 producers present.

Russell Rarey, vice-president of the Marble Cliff Quarries Co., presided. The morning program was devoted to the officers' reports, and to the election of members of the committee. The afternoon program included a general discussion of code interpretations, and sales tax application to the industries, and an address by O. W. L. Coffin, assistant administrator for the Ohio Recovery act.

Officers re-elected for 1935 were: Russell Rarey, Columbus, chairman; Wm. Edward Hole, Greenville; W. E. Bliss, Youngstown, and H. M. Sharp, Toledo, vice-chairmen; Stephen Stepanian, Columbus, treasurer; and Claude L. Clark, executive secretary. The office of the aggregate code is 403 Majestic building, Columbus.

New Installation Weighs Bulk Cement into Barges

★ The Universal Atlas Cement Co. recently installed at its Hannibal, Mo., plant a Richardson Duo-Screw Feed type automatic scale for weighing bulk cement into barges. The scale has a unit weighing capacity of 1,500 lb. and an hourly capacity of 450 bbl.

Silicosis Suit Against Missouri Firm Dismissed

A silicosis suit for $30,000 against the Pittsburgh Plate Glass Co., Crystal City, Mo., was dismissed Feb. 25 by Federal Judge Faris at St. Louis. The plaintiff, F. A. de Rousse, said that he had X-ray pictures of his lungs taken at the suggestion of a lawyer. A stipulation which he signed Nov., 1933, at the office of the company was admitted as evidence. At that time he was paid $100.

Gold-Mining Boom Aids California Lime Plant

★ The increased price of gold has directly stimulated some other forms of mining, notably the production of lime. Some of the larger companies are using greater quantities of lime in their cyanide plants. One producer to share in this business is the Auburn Chemical and Lime Co., whose plant near the Rattlesnake Bar Bridge, eight miles east of Auburn, Cal., is working at full capacity. The mine had been worked only part time for the last three years. A new hammer-type mill for grinding rock to be used in the manufacture of glass and other products has recently been added to the plant. The history of the mine dates back to the early 60's when it was operated by Chinese miners. V. H. Johnson is superintendent of the plant and the president of the company is Charles Kemper.

★ The Starr Gravel Co., Mission, Tex., is rebuilding its plant near that city. O. E. Gooding, general manager and superintendent of the Standard Gravel Co., Pontiac, Mich., is in charge of this work.

January Contract Awards Slightly Over December

RESIDENTIAL BUILDING LEADS

Construction awards in the 37 eastern states during January exceeded the total for December by about $7,000,000 or almost 8 per cent. according to F. W. Dodge Corp. The January total of $99,773,900 for all classes of construction, however, was only 53 per cent. as great as the total of $186,463,700 reported for January, 1934. In making comparisons with a year ago it should be recalled that at that time contract-letting under the PWA program reached its peak.

Residential building contracts let in January, 1935, were 53 per cent. greater in aggregate value than in December, 1934; at the same time a gain of about 48 per cent. was shown when contrasted with the total for January, 1934. Though these percentage gains are gratifying the January dollar total of residential building contracts, amounting to $22,410,200 for the 37 eastern states, was only about 40 per cent. as great as in January, 1931, itself a depression period.

South Carolina Holds District Code Meeting

The producers of the South Carolina District of Region 5 (Alabama, Florida, Georgia, Mississippi and South Carolina) met March 6 at Columbia, S. C. The entire existing committee representing the sand and gravel, crushed stone and slag industries in South Carolina was reëlected. A list of members of the committee is appended:

Crushed Stone:
- R. S. Campbell, Holston Quarry Co. of South Carolina, Knoxville, Tenn.
- G. D. Lott, Palmetto Quarries Co., Columbia, S. C. (Chairman of committee)
- D. E. Saunders, South Carolina Granite Co., Columbia, S. C.

Sand and Gravel:
- R. L. Kerr, Jr., William M. Bird & Co., Columbia, S. C.
- W. R. Bonsal, Lawrence Stone & Gravel Co., Raleigh, N. C.
- John Wilson, S. W. Wilson & Sons, Inc., Columbia, S. C. (Secretary of committee)

Slag:
- C. A. Barinowski, Birmingham Slag Co., Birmingham, Ala.
- C. E. Ireland, Birmingham Slag Co., Birmingham, Ala.
- G. A. Mattison, Woodstock Slag Corp., Birmingham, Ala.

North Carolina Kianite Plant Installs Equipment

★ Celo Mines, Inc., Burnsville, N. C., operators of an experimental Kianite plant for some time, have completed the conversion of this plant into a commercial operation by the addition of considerable equipment.

Building Permits Show Gain Over January, 1934

RESIDENTIAL VALUE DOUBLED

An increase of 15.0 per cent. in the number and an increase of 23.5 per cent. in the estimated cost of building operations comparing January, 1935, with the corresponding month of the previous year was reported by the U. S. Department of Labor. New residential buildings increased 67.0 per cent. in number and 105 per cent. in estimated cost comparing these two months. The increase was spread over 7 of the 9 geographic divisions. This information is based on building permit reports received by the Bureau of Labor Statistics of the United States Department of Labor from 776 identical cities having a population of 10,000 or over.

The number of family-dwelling units provided in new buildings increased 111.4 per cent. comparing permits issued in January, 1935, with those issued in January of the previous year. Comparing January, 1935, with December, 1934, there was a decrease of 6.0 per cent. in the number but an increase of 17.1 per cent. in the value of building operations.

The permit valuations as published include, in addition to private and business structures, all public buildings for which contracts are awarded by Federal and State governments in these 776 cities. For the month of December the value of such public building was $2,202,318; for January, $2,218,557.

South American Plant to Install Slurry Filters

★ The Juan Minetti y Hijos Cement Co., Cordova, Argentina, has purchased two Oliver American-type filters. These are 12 ft. 6-in. 7-disk units and will be installed on Polysius kilns. A capacity of about 220 metric tons of slurry is expected from each kiln.

Low Cement-Coal Stocks Presage Big Buying Later

As summarized from the reports of the cement producers supplemented by a few estimates, the following quantities of fuel were consumed at the Portland cement plants in the United States in the month of January, 1935, in the production of 3,202,000 bbl. of finished cement: Coal, 155,051 short tons; oil, 98,740 bbl. (or 4,147,080 gal.); and natural gas, 1,422,416,720 cu. ft. The producers also reported 220,320 short tons of coal in stock at the mills at the end of January, 1935.

The following quantities of fuel were consumed in the month of December, 1934, in the production of 4,447,000 bbl. of finished cement: Coal, 179,800 short tons; oil, 152,760 bbl. (or 6,415,920 gal.); and natural gas, 1,661,505,403 cu. ft. The producers also reported 231,938 short tons of coal in stock at the mills at the end of December, 1934.

Corresponding figures from the producers' reports for November, 1934, are as follows: Finished cement produced, 5,779,000 bbl.; and fuels consumed in its manufacture—coal, 249,711 short tons; oil, 173,839 bbl. (or 7,301,238 gal.); and natural gas, 2,352,484,658 cu. ft. The producers also reported 229,379 short tons of coal in stock at the mills at the end of November, 1934.

In addition to the above fuels, one plant in November reported the use of coke oven gas, and one plant in November, two in December, and three in January, 1935, reported the use of petroleum coke. The plants reporting the use of petroleum coke also reported the use of other fuels.

Wolverine Installs Bulk Cement Automatic Scale

★ The Wolverine Portland Cement Co., Coldwater, Mich., recently installed a Richardson Duo-Screw Feed type automatic scale for weighing bulk cement into cars. The scale has a unit weighing capacity of 1,000 lb. and an hourly capacity of 320 bbl.

U. S. Gypsum Co. Buys Stewart Inso Board Co.

The United States Gypsum Co., Chicago, Ill., has purchased the Stewart Inso Board Co., of St. Joseph, Mo. Operation of the plant will be continued and expansion of machinery and buildings is said to be contemplated.

Oregon Stone Company Plans Lime Production

★ The Oregon Lime Products Co. late in 1934 completed the construction of a complete crushing and grinding plant on Williams Creek between Williams and Provolt, 18 miles south of Grants Pass, Ore. A complete line of poultry grits and ground limestone is being produced. Installation of equipment for the production of lime will be completed this year, it is reported.

N. C. S. A. Officers Now Ex-Officio Board Members

Through an amendment to the Constitution of the National Crushed Stone Assn., made at its recent convention in Chicago, Ill., J. R. Boyd, secretary, and A. T. Goldbeck, director of the Bureau of Engineering of the association, were made ex-officio members of the board of directors.

To Hold 1935 Building Mechanics Exposition

SAN FRANCISCO TO BE SITE

Sponsored by the San Francisco Builders Exchange, one of the largest organizations of its sort in the United States, a Building Mechanics Exposition is to be held in San Francisco during the late spring of 1935.

This announcement was made by W. H. George, president of the Builders Exchange and secretary and general manager of the Henry Cowell Lime & Cement Co., who is taking a leading part in the development of plans for the event.

The purposes of the exposition, which will be similar to those of the old Mechanics Fair, an annual event in San Francisco for many years up to the fire of 1906, is primarily to afford the vast potential buying power of the trade area of the Pacific Coast the opportunity to visualize and inspect the manifold products used in building construction.

New Gravel Plant Under Construction in Alabama

★ Work is proceeding on the erection of a new sand and gravel plant by the Golden Sand & Gravel Supply Co. at Golden, Ala. Equipment includes a dredge capable of supplying 100 cu. yd. per hr. of material to the screening plant. The TVA is investing thousands of dollars in a power line to the plant which is expected to begin operations early in March.

F. H. Rhodes New Head of Monarch Cement Co.

Fred H. Rhodes, a member of the board of directors of the Monarch Cement Co., Chanute, Kans., since 1913, has been elected president and general manager to succeed the late H. F. G. Wulf. Walter H. Wulf, son of the late president, was elected vice-president to fill the vacancy caused by the death of A. C. Kreitzer on Jan. 6. C. A. Brooke, sales manager since 1918, was elected vice-president from the board. F. A. Woolf was elected secretary and treasurer to succeed Mr. Rhodes who had held the position since 1917.

★ The Minnesota Mining & Mfg. Co., Wausua, Wis., is reported to be erecting a colored quartz storage warehouse with a capacity of 10,000 tons. It is stated that 200 bins of 50-ton capacity each are being erected.

★ The Idaho Portland Cement Co., Inkom, Idaho, announces a $50,000 improvement program at its plant which will include the expansion of its cement storage facilities.

A. I. of M. & M. E. Holds Meeting in New York

NEW INDUSTRIAL MINERAL DIV.

The American Institute of Mining & Metallurgical Engineers at its annual meeting held in New York City, February 18-21, appointed a committee to investigate the advisability of creating a new Industrial Minerals Division devoted to the technical problems of the non-metallic mineral industries. Creation of this division would enlarge the work of the Committee on Nonmetallic Minerals to include subjects of interest to crushed stone and sand and gravel producers who at present form only a small proportion of the membership of the Institute. It was also announced that a volume covering the problems of industrial minerals would be published.

Among the papers presented was a report by B. L. Miller of Lehigh University and C. H. Breerwood of the Valley Forge Cement Co., covering the experiments which have been conducted at that plant on the processing of limestone by flotation methods. Investigations are said to be under way on the improvement of chemical limestone by the removal of impurities by this process which was first developed for the cement industry. Investigations are also being made on the processing of limestone for dry-process cement plants.

The application of geophysical surveys to the nonmetallic mineral industries received considerable attention in the program. S. W. Wilcox described work done in Minnesota on the use of earth-resistivity methods for locating commercial sand and gravel deposits. He stated that these surveys were followed by the usual test methods which in almost every case substantiated the geophysical findings.

Paul M. Tyler, U. S. Bureau of Mines, presented a summary of mechanical preparation of nonmetallic minerals in which he outlined some of the economic factors influencing their preparation in contrast with metallic minerals. Differences in physical characteristics, consumer acceptance, recognized markets, prices, and other economic considerations were outlined.

In a summary of new developments in the potash industry, H. I. Smith, U. S. Geological Survey, reported that the productive capacity of this country now exceeded 1,000,000 tons annually, making it independent of foreign supplies. In spite of this capacity, said Mr. Smith, less than half of the potash used in this country is supplied by domestic producers. The unrestricted admission of potash duty-free from countries having lower labor costs, he said, is responsible for this condition. Other speakers on the program also enlarged on this situation.

Development in industrial minerals production in California were reported by W. W. Bradley, state mineralogist, who stated that 30 or more industrial minerals are produced in that state. M. M. Leighton, Illinois state geologist, reported progress in the research problems of nonmetals in that state. A method for classification of surface mining methods was suggested by J. R. Thoenen, U. S. Bureau of Mines.

Public Hearing to Clarify Definitions of Producers

In order to clarify the definitions of producers as contained in the crushed-stone, sand-and-gravel and slag code (No. 109) the National Recovery Administration will hold a public hearing at 10 o'clock in the morning of March 21 in the auditorium of the Department of Commerce Building in Washington. It is thought that the definitions should be amended and possibly amplified in order to make the scope of the code obvious to all persons concerned. An opportunity to be heard either in person or by duly appointed representative (either by appearance or by sending a written or telegraphic statement) will be given to persons or groups who have a substantial interest in the questions raised, either as workers, employers, consumers or otherwise.

Cement and Aggregates Over Half R.F.C. Purchases

Purchases of nonmetallic minerals and their products for projects financed by the R.F.C. in the month ended December 15, 1934, amounted to $308,954, bringing the 9-month total to $3,535,349. Of the latter sum, as shown in the accompanying table, $1,346,371 was spent for cement, $398,600 for sand and gravel, and $37,477 for crushed stone.

NONMETALLIC MINERALS AND THEIR PRODUCTS PURCHASED FOR PROJECTS FINANCED BY THE RECONSTRUCTION FINANCE CORPORATION IN 1934

Materia	Value of Material Orders Placed		
	From Mar. to Nov. 15, 1934	During Month Ended Dec. 15, 1934	Total (9 months) from Mar. to Dec. 15, 1934
Cement	$1,208,882	$137,489	$1,346,371
Sand and gravel	370,853	27,747	398,600
Crushed stone	28,407	9,070	37,477
Lime	8,850	.....	8,850
Marble, Granite, slate and other stone products	101,102	.....	101,102
Clay products	305,331	11,648	316,979
Concrete products	1,199,813	123,000	1,322,813
Glass	3,157	.....	3,157
	$3,226,395	$308,954	$3,535,349

The sums spent for P.W.A. project materials and for materials used on projects financed from regular government appropriations are shown elsewhere in these pages.

★ The Light Weight Aggregate Co. is said to be producing pumicite from the quarry of Percy King, Jr., near Napa, Cal. A crushing plant has been installed.

Lime Employee Wins $22,500 Silicosis Suit

SUITS PENDING FOR $155,000

A motion to set aside the appointment of a receiver for the Glencoe Lime & Cement Co., St. Louis, Mo., was upheld Feb. 20 in circuit court. The company had been thrown into receivership Feb. 12 to protect its assets from being wiped out through damage suits brought by former employees who claim to have contracted silicosis while in the company's employ. G. H. F. Johannes, president of the company had been appointed receiver for the company on the petition of an unsecured creditor and with the company's consent. The circuit court had also granted an injunction restraining Cosmer Alexander, holder of a $22,500 judgment against the company, from obtaining an execution against its property. The injunction also restrained the plaintiffs in other silicosis suits against the company from proceeding with the prosecution of such legal actions, and prohibited the filing of a new damage suit against the company. The aggregate amount sought in pending silicosis suits is reported to be $155,000.

The company's assets of $1,452,373 are said to greatly exceed its liabilities, but its credit had been greatly injured by reason of the Alexander judgment, the other suits which are pending and still others that may be filed by former employees, according to the petition.

During the past 18 months several hundred suits have been filed in the state and federal courts in St. Louis and vicinity by men and women who claim to have contracted silicosis while formerly employed. The aggregate amount sought in these various suits is placed at $15,000,000, and it is admitted that they would wipe out a number of industrial concerns if all of the plaintiffs were able to obtain judgments for the maximum amounts they are seeking. Lead, cement and sand companies, glass plants and flour mills have been among the defendants named in these wholesale suits. In each case the employer is charged with negligence in failing to take proper precautions to prevent employes from being affected by silica poisoning.

1934 Lime Sales Exceed 1933 Value and Quantity

Sales of lime in 1934 by producers in the United States amounted to 2,407,000 short tons valued at $16,996,000, according to preliminary reports to the Bureau of Mines. This was an increase of 6 per cent. in quantity and 19 per cent. in value compared with sales of 2,269,280 tons valued at $14,235,659 in 1933.

Aggregate Code Budgets Presented for Approval

THREE MONTHS TOTAL $197,915

The Executive Council of the Code Authority for the crushed-stone, sand-and-gravel and slag industries (Code No. 109) recently presented to the National Recovery Administration for approval interim budgets and bases of contribution by members of the industry for the expense of administering the Code Authority by regional, state, district and divisional committees for the three-month period ending March 31. The total amount of the budgets is $197,915.01.

Members of the industry are assessed their proportionate share of their approved budgets on the basis of their 1934 production, provided, however, that the Code Authority and the regional, state, district and divisional committees shall be permitted to bill members of the industry on the same monthly basis used last year, and approved in Administration Order No. 109-35, pending the compilation of 1934 production statistics, with the understanding that the accounts of all members of the industry shall be adjusted in accordance with an assessment based on the 1934 production figures as soon as these can be employed, such adjustment to be made in any event before March 31, 1935. The application was approved by the National Recovery Administration on February 1 as Order No. 109-76 and became effective on February 21, before which date any criticisms, objections to, or suggestions concerning the budgets were required to be filed with Deputy Administrator W. A. Janssen. The following tabulation, identified as Exhibit B, shows the budgeted expenses of the Code Authority and the regional, state, district and other committees for the first three months of this year. It shows a total estimated expenditure of $197,915.01, as already stated.

SUMMARY OF INTERIM BUDGETS FOR THE PERIOD OF JANUARY 1, 1935, TO MARCH 31, 1935
for the
Crushed-Stone, Sand-and-Gravel, and Slag Industries Code Authority and Certain Regional, State, District and Divisional Committees

Agency	Total for Budget for Period of Jan. 1 to Mar. 31, 1935	
National Code Authority	$ 35,759.00	
Agencies Having Approved Budgets in 1934		
Region No. 1		
Regional Committee	$ 657.02	
State Committee of Connecticut	430.25	
State Committee of Massachusetts	440.00	
District Committee 1	2,000.00	
District Committee 2	3,500.00	
District Committee 3	3,615.00	$ 10,643.17
Region No. 2		
Regional Committee and State Committee of New York	$ 3,000.00	
District Committee 2	750.00	
District Committee 3	750.00	
District Committee 4	900.00	
District Committee 5	1,027.00	
District Committee 6	732.87	
District Committee 7	200.00	7,359.87
Region No. 3		
Regional Committee	$ 1,927.50	
District Committee 2	1,850.00	
District Committee 3	3,750.00	
District Committee 4	2,250.00	
District Committee 5	2,950.00	
District Committee 6	1,500.00	
District Committee 7	3,304.47	
District Committee 8	2,625.00	20,156.97
Region No. 4		
Regional Committee	$ 2,250.00	
State Committee of West Virginia	600.00	
District Committee of District of Columbia	1,000.00	
District Committee of Maryland	1,918.96	
District Committee of Virginia	1,687.50	
District Committee West Virginia Aggregates District	2,152.50	9,608.96
Region No. 5		
Regional Committee	$ 1,812.50	
District Committee of Alabama	1,025.00	
District Committee of Mississippi	890.00	
District Committee of South Carolina	270.00	3,997.50
Region No. 6		
Regional Committee	$ 700.00	
State Committee of Kentucky	1,327.50	
State Committee of Tennessee	600.00	
District Committee of Kentucky	1,540.00	
District Committee of North Carolina	1,387.50	
District Committee Tennessee 1	450.00	
District Committee Tennessee 2	750.00	
District Committee Tennessee 3	375.00	7,130.00
Region No. 7		
Regional Committee	$ 6,830.00	
District Committee 1	450.00	
District Committee 2	450.00	
District Committee 3	945.00	
District Committee 5	550.00	
District Committee 6	500.00	
District Committee 7	1,125.00	
District Committee 8	750.00	11,600.00
Region No. 8		
Regional Committee and State Committee of Ohio	$ 4,125.00	
District Committee 1	1,250.00	
District Committee 2	1,025.00	
District Committee 3	1,750.00	
District Committee 4	1,550.00	
District Committee 5	750.00	
District Committee 6	1,062.50	
District Committee 7	665.00	
District Committee 8	1,000.00	13,177.50
Region No. 9		
Regional Committee	$ 1,406.25	
District Committee 1	1,801.00	
District Committee 2	2,072.45	
District Committee 3	2,250.00	
District Committee 4	3,000.00	11,529.70
Region No. 10		
Regional Committee	$ 7,818.59	7,818.59
Region No. 11		
Regional Committee	$ 1,500.00	
District Committee of Minnesota 3	1,005.00	
District Committee 5	99.00	
District Committee 7	112.00	
District Committee 8	690.00	
District Committee of Minnesota Portable Producers	1,308.00	4,714.50
Region No. 12		
Regional Committee	$ 1,770.00	
District Committee of Iowa "C"	1,225.00	2,995.00
Region No. 13		
Regional Committee	$ 4,170.00	
State Committee of Kansas	1,000.00	
State Committee of Missouri	1,068.75	
State Committee of Oklahoma	564.50	
District Committees Kansas 1 and 2	1,500.00	
District Committee Missouri 1	975.00	
District Committee Missouri 2	1,275.00	
District Committee Missouri 3	450.00	11,003.25
Region No. 14		
Regional Committee	$ 3,831.25	
State Committee of Arizona	388.75	
State Committee of Colorado	746.25	
State Committee of New Mexico	671.00	
State Committee of Utah	671.00	
District Committee 1	1,042.50	
District Committee 2	432.50	
District Committee 3	1,042.50	
District Committee 4	438.00	
District Committee 5	536.25	
District Committee 6	700.00	10,500.00
Region No. 15		
Regional Committee	$ 2,705.00	
State Committee of California	1,535.00	
District Committee of Northern California	3,450.00	
District Committee of Southern California 1	900.00	
District Committee of Southern California 2	3,825.00	
District Committee of Southern California 4	525.00	12,940.00
Region No. 16		
Regional Committee	$ 3,827.50	
District Committee 1	3,294.50	
District Committee 2	1,230.00	
District Committee 3	900.00	
District Committee 4	1,524.00	10,776.00
Total Interim Budgets of Expense of Regional, State and District Committees having approved budgets in 1934		$155,951.01
Division Committee for Industrial Sand	$ 4,500.00	4,500.00
Total Interim Budgets of Expense of Other Agencies having approved budgets in 1934		$160,451.01
Agencies Having No Previously Approved Budgets.		
District Committee of Florida	$ 55.00	
District Committee of Georgia	100.00	155.00
Region No. 7		
District Committee 4	$ 450.00	450.00
Region No. 11		
District Committee 2	$ 50.00	
District Committee 6	300.00	350.00
Region No. 13		
District Committee of Oklahoma	$ 300.00	300.00
Region No. 15		
District Committee 3	$ 450.00	450.00
Total Interim Budgets of Expense of Other Agencies having no previously approved budgets		$ 1,705.00
SUMMARY OF BUDGETS FOR EXPENSES.		
I. Budget of National Expense (Code Authority)	$ 35,789.00	
II. Budgets of Expense of Other Agencies:		
Regional, State, and District Committees having approved budgets in 1934	155,951.01	
Division Committee for Industrial Sand	4,500.00	
Regional, State, and District Committees having no previously approved budgets	1,705.00	
Total		$197,915.01

PWA Road Work Now Employing 68,035 Men

7,166 MI. UNDER CONSTRUCTION

Progress made on the emergency construction of public-works highways to March 2 under the supervision of the U. S. Bureau of Public Roads shows a total of 605 projects, estimated to cost $25,027,000, approved but contracts not yet awarded; 1,026 projects, estimated to cost $37,786,000, awarded but not yet under construction; 2,575 projects, estimated to cost $154,449,000, under construction; and 7,823 projects completed at a cost of approximately $346,614,000.

The 2,575 projects under construction involve 7,166 miles of road and are giving regular direct employment to 68,035 men.

The above figures include projects involving funds provided by the Acts of June 16, 1933, and June 18, 1934.

Organized Labor Asks for 30-Hr. Work Week

INDUSTRY OPPOSES REDUCTION

Definite views favoring the adoption of a basic maximum work week of 30 hr. were presented by organized labor at the public hearings of the National Industrial Recovery Board which began January 30 and continued through February 2. The demand for the shorter week was presented by William Green, president of the American Federation of Labor, and was supported by John L. Lewis, president of the United Mine Workers of America; the Rev. Father Francis J. Haas of the National Catholic Social School of Service; Miss Rose Schneiderman, president of the National Women's Trade Union League; David Dubinski, president of the Ladies' National Garment Workers' Union; Arthur O. Wharton, president of the International Association of Machinists; Francis J. Gorman, international first vice-president of the United Textile Workers of America.

Industry, which is in general opposed to the adoption of the 30-hr. week on the grounds that it will not absorb the unemployed and would lower the living standard of those now employed, was represented by Ralph E. Flanders, a machinery manufacturer; W. R. Webster, a brass manufacturer; Robert West of the textile industry; H. H. Anderson of the oil industry; Noel Sargent, an economist; Hal B. Moore, a woolen-mill operator; Frederick W. Aldred, a retailer; Charles R. Hook of the steel industry; Roscoe Edlund, a consumer; C. H. Janssen, of the foodstuffs industry; Prof. O. G. Saxon, of the Department of Business Administration of Yale University; Peter Van Horn of the silk industry; and others.

The meeting was presided over by S. K. William, chairman of the board, who has since offered President Roosevelt his resignation, and hearings were limited to consideration of the general aspects of employment provisions, not including Sec. 7 (a) of the National Industry Recovery Act. According to Mr. Williams, the board contends that a minimum-wage structure is socially beneficial, not only as a standard to the worker but also as a wage "floor" for the operation of the competitive system. He said it is important "to determine the effect which inequalities in wages above the minimum have upon competitive and other conditions and to ascertain what the solution should be. . . . Geographic and population and other wage differentials being concomitants of our industrial developments, are to be treated as significant realities of the present situation." He called for "constructive treatment of a character which will not violate or disrupt employment conditions." He contended that the maximum-hour provisions of the codes have made a definite contribution to employment and that the principle of hours limitation should be maintained.

Speaking for the attitude of labor William Green said, "More than a million and a half wage earners went back to work as a result of reduced hours provided by N. R. A. codes." He alleged that there has also been an increase in pay-rolls and the abolishment of child labor. He expressed the opinion that the National Recovery Administration had failed "to make effective the more basic and the more fundamental purposes of the recovery program," and called attention to the fact that the National Industrial Recovery Act was, in a large sense, a substitute measure for the 30-hr. bill which had already passed the Senate by an overwhelming vote when the recovery bill was introduced in the House early in 1933. He added that labor had hoped that the act would accomplish substantially the same results as those which the bill sought to attain. He insisted that a drastic reduction in the hours of work fixed by the codes must be made, "if we are to meet our problem of unemployment. . . . Until we solve it we can hope for little in the way of recovery. . . . I believe sincerely that the adoption of the 30-hr. week in Codes of Fair Competition would solve this problem, would return to industry the major portion of our unemployed, and would be the first step in increasing purchasing power which would be essential to recovery."

Mr. Green continued by saying, "We have shifted from the 12-hr. day to the 10-hr. day and from the 10-hr. day to the 8-hr. day and, strange and contradictory as it may seem, we have reduced unit costs as we have shifted. . . . Because of the efficiency of the worker developed during the shorter work week and the resourcefulness of management we will find within a very short time that the unit cost of production will be decreased rather than increased."

Mr. Green admitted that the 30-hr. week should not be applied inflexibly, but that it should be made just and equitable. He advocated the creation of a national board with power to consider and determine appeals for exemption because of unusual conditions.

Speaking for the opposition, Mr. Flanders, president of the Jones & Lamson Machine Co. of Springfield, Vt., said that "a recovery, to be real, must be expressed in terms of increase in the production and distribution of goods and services, and further reduction of hours can not possibly produce such an increase. A further shortening would obviously produce a decrease. It would be a death blow to recovery." He added that in 1928 and 1929, when 80 per cent. of our normal productive capacity was engaged and our available labor supply was more than 80 per cent. employed at an average number of hours per week at least 25 per cent. greater than the hours set by the codes, we were still unable to provide a standard of living for the mass of the people which was up to our physical possibilities or to their deserts. By what magic process can we hope even to equal that unsatisfactory record, if we cut 40 per cent. or more off the working week as is now proposed."

W. R. Webster, chairman of the Employment Relations Committee of the National Assn. of Manufacturers and chairman of the board of the Bridgeport Connecticut Brass Co., advocated the adoption of a universal week of not less than 40 hr., the individual employed to be allowed to work voluntarily for longer periods. He suggested compensation for overtime on a sliding scale, under which the payment would be proportionate to the relation of the overtime hours to the basic 40 hr. "Hourly wages of all classifications should be as high as economically possible, taking into consideration such vital factors as scarcity of the better type of labor desired, the capacity of the individual employed, living costs in communities, the ability of the industry to pay, and the willingness and the ability of the consumer to buy," he stated.

Representing consumers, Roscoe Edlund advocated "a continuation of policies already begun and a moratorium against further general experiments." He credited the N. R. A. with having halted the downward trend of hourly wages, with having wiped out child labor and with having built a "floor under human labor," by establishing minimum pay rates and adding hundreds of thousands of workers to pay-rolls. He contended that it also prevented the adoption of the "uneconomic, impracticable and dangerous idea" of a flat 30-hr. week.

In October, 1934, according to John L. Lewis, the average hours worked per week in all manufacturing industry was 34.5. He claimed that fluctuations in employment since the codes have gone into effect show "that the 40-hr. week has not only failed to reduce unemployment materially but thus far has failed to produce any incentive for employers to stabilize employment."

To Mr. Lewis' remarks Francis J. Gorman added the comment that "unless the hours of work are materially reduced to balance . . . increase in productive efficiency, technological improvement will bring our doom." This was an echo of the principles set up by the technocrats several years ago. He said that the 40-hr. week had failed to provide sufficient reëmployment because the prevailing week in industry before and under the codes averaged less than 40 hr.

John P. Fry, president of the metal trades department of the American Federation of Labor, recommended a reduced work week and a modification of minimum-wage differentials. "If there must be wage differentials in the South based on industrial conditions which have developed over many years," he said, "then the differences

(Continued on page 23)

Many Industries Show Improvement in 1934

SOME GAIN OVER 50 PER CENT.

The Bureau of Foreign and Domestic Commerce has issued some interesting figures showing the percentage of improvement in various industries for 1934 as compared with 1933. The iron-and-steel production index rose to 60 points in 1934, which was a 7-point, or a 13.2-per cent. increase over 1933. Mineral production touched 86, a gain of 5 points, or 6.2 per cent. Cement gained 10 points, reaching 52 points against a record of 42 in 1933. Advertising, which is believed to reflect very accurately the state of business, showed an increase in magazines from 18,664,874 lines in 1933 to 24,324,690 lines in 1934, a rise of 30.4 per cent. Newspaper lineage in 52 reporting cities was 1,780,880,397 in 1934, as compared to 1,065,514,601 in 1933. Factory employment reached 78.7 points in 1934, which was a gain of 9.7 points over 1933. Factory pay-rolls rose 13.4 points or 27.6 per cent. Employment in retail trade reached 82 points, an increase of 5.9 per cent. for the year. Department stores registered 75 points for 1934, as against 67 points for 1933, variety stores 90.4 points against 82.5, and rural chain stores 83.7 points against 69.2.

Increases in checking transactions through the banking system are indicated by a rise of nearly 9 per cent. in bank debits.

The automobile industry has shown a remarkable improvement. In 1934 it produced 2,800,000 passenger cars and trucks, 1,980,000 in 1933 and 1,430,000 in 1932. This industry purchased 1,120,000 tons more steel in 1934 than in 1932, and its purchases of other materials increased proportionately.

Cement and Lime Lead in Gov't Material Purchases

A total of $881,169 was spent for nonmetallic minerals and their products for construction projects financed from regular government appropriations in the 5½ months ended December 15, 1934. The purchases of cement and lime amounted to $303,504, the largest single figure in the accompanying table. Sand-and-gravel purchases totaled $155,632 and crushed-stone purchases $95,838.

The amounts spent for similar materials by the P.W.A. and for projects financed by the R.F.C. are given elsewhere in these pages.

NONMETALLIC MINERALS AND THEIR PRODUCTS PURCHASED FOR CONSTRUCTION PROJECTS FINANCED FROM REGULAR GOVERNMENT APPROPRIATIONS IN 1934

Material	Value of Material Orders Placed		
	From July 1 to Nov. 15, 1934	During Month Ended Dec. 15, 1934	Total (5½ months) from July 1 to Dec 15, 1934
Cement and lime	$226,469	$77,035	$303,504
Sand and gravel	109,863	45,769	155,632
Crushed stone	70,982	24,856	95,838
Marble, granite, slate and other stone products	93,315	74,783	168,098
Concrete products	34,830	9,600	44,430
Glass	1,907	6,039	7,946
Paving mixtures	40,087	9,204	49,291
Wall plaster, wall board, etc	51,143	4,037	55,180
Asbestos	.....	1,250	1,250
	$628,596	$252,573	$881,169

Ohio Producer Planning Additional Improvements

★ The Hurst Sand & Gravel Co., Dayton, O., recently installed two Eagle screw washers. According to Charles Hurst, owner, additional equipment will be installed, including a 4-deck, 4 by 8-ft. vibrating screen; sand dewatering tanks; a roll crusher; a portable gravel-washing plant, etc.

Cement and Aggregates Lead PWA Materials

In the 15 months ended December 15, 1934, a total of $207,889,517 was spent for nonmetallic minerals and their products to be used on Public Works Administration projects. The accompanying table shows the amount spent for each material in the month ended December 15, in the 14 preceding months, and for the entire period.

For cement $93,815,568 was spent in the 15 months, for sand and gravel $42,511,460, and for crushed stone $25,511,837.

NONMETALLIC MINERALS AND THEIR PRODUCTS PURCHASED FOR PUBLIC-WORKS PROJECTS IN 1933 AND 1934

Material	Value of Material Orders Placed		
	From Beginning of Program to Nov. 15, 1934	During Month Ended Dec. 15, 1934	Total (15 months) From Beginning to Dec. 15, 1934
Cement	$89,729,159	$4,086,409	$93,815,568
Sand and Gravel	40,330,261	2,181,199	42,511,460
Crushed stone	24,252,506	1,259,331	25,511,837
Lime	162,369	2,494	164,863
Marble, granite, slate and other stone products	9,400,935	1,087,184	10,488,119
Clay products	7,810,503	912,801	8,723,304
Concrete products	10,356,602	1,440,387	11,796,989
Glass	399,910	51,096	451,006
Paving materials and mixtures	10,437,856	538,716	10,976,572
Roofing, asphalt shingles, etc	1,672,980	183,726	1,856,706
Wall plaster, wall board, etc	1,303,567	133,310	1,436,877
Asbestos	57,843	300	58,143
Minerals and lath	97,925	148	98,073
Totals	$196,012,416	$11,877,101	$207,889,517

Other tables in this issue show the sums spent for similar materials for projects financed by the R.F.C. and by regular government appropriations.

★ A feldspar drying plant is reported to have been put into operation recently at Satanta, Okla., by the Mid-Co. Co., Kansas City, Mo. E. H. Harris will be in charge of operations. The company also operates mines and plants at Meade and Gates, Okla.

Work Relief Bill is Again Before Senate

DIVIDED BY TYPES OF WORK

The five billion dollar work-relief bill was reported out on the floor of the senate again on March 5 after President Roosevelt had made minor concessions with respect to the earmarking of funds. The appropriations committee accepted a proposal to break down the fund by types of work, reserving a leeway of $800,000,000 for the president with which he may increase the amount of any type of work. The allocations in the bill are: Highways and grade crossings, $800,000,000; Rural rehabilitation and the relief of stricken agricultural areas, $500,000,000; Rural electrification, $100,000,000; Housing projects, $450,000,000; Projects for professional and clerical persons, $300,000,000; Civilian conservation corps, $600,000,000; Non-federal projects for states and their political subdivisions, $900,000,000; Sanitation, prevention of soil erosion, flood control and reforestation, $350,000,000.

General Crushed Stone Buys Mohawk Limestone

The General Crushed Stone Co., Easton, Pa., has purchased the plant of the Mohawk Limestone Products Co., Jordanville, N. Y., according to an announcement by D. W. Finch, who will be retained as manager.

Texas Producer Plans to Build New Gravel Plant

★ James Donaldson, Inc., 302 Lambrano, San Antonio, Tex., are planning to erect a new sand and gravel plant near that city, according to T. D. Parr, treasurer of the company. This plant will be operated as the Bexar Gravel Co.

Thirty-Hr. Week (from page 22)

should not be more than the difference in freight rates southern manufacturers must pay when shipping their goods to northern markets. No one section in the United States is entitled to labor conditions permitting it to have an unfair advantage over other states."

Noel Sargent, the economist, asserted that while the shorter week might benefit the unemployed worker, the standard of the living of millions now employed would be greatly reduced due to a decrease in purchasing power of the working class as a whole.

Prof. O. G. Saxon, who spoke not as a representative of Yale University, expressed the opinion that a 30-hr. week would either bring about a great increase in prices to be passed on to the consumer or another downward "deflationary spiral."

Editorials

Recovery or Reform

A GREAT many of those who attempt to shape public opinion through the editorial columns of the press have found inspiration in the words "Recovery or reform." From what they have said one might conclude that these writers consider the two terms mutually exclusive, as if the proposition were necessarily disjunctive, being composed of what they would doubtless call antithetical ideas. To none of them does it seem to have occurred that we might have recovery *and* reform quite as well as recovery *or* reform.

To business men generally, as well as to those of us whose reactions are conditioned by the business point of view, recovery—meaning business recovery—appears to be the only condition necessary to the restoration of happiness and national well-being. This opinion forms itself naturally in the minds of men whose chief concern is the profitable conduct of business enterprise. As long as their businesses, individually but not necessarily collectively, show a profit, there appears to be no occasion for alarm. It is a matter of no, or relatively little, importance to them that other businesses should not prosper, unless those businesses happen to be potential buyers of their products or services, in which case the condition of those other enterprises assumes great importance in their eyes. Beyond this natural concern about those on whom their own businesses depend, most business men appraise the condition of the country in terms of the relative success or failure of their own enterprises. And as long as the ratio of success to failure over a period of years is a positive relation, they show little interest in broad social or industrial problems that may call for reform. Recovery and reform, therefore, are seldom associated with one another, even though they may be essential to, or largely dependent upon, each other.

Among the causes of our recent economic troubles were numerous social difficulties not known to, or little understood by, the average business man. The prevalence of unemployment, even in times of "prosperity" as that term is generally used, was recognized in only small circles outside the labor group. It has been estimated that as many as 8,000,000 "employables" have been unemployed during what were called "good" years. If this be only approximately true, it is evident that our economic structure is a very sensitive one to have been so seriously disturbed by an increase of but some forty per cent. in that number.

Another factor that escaped the attention of most of us was the extent to which child labor was employed in many industries. As consumers we were willing to purchase goods at prices that attracted us without inquiring into the kind of labor employed in their manufacture or the wages paid to that labor; our concern seldom if ever passed beyond the narrow limits of our self-interest as that disclosed itself at the moment. As a result, knowledge of the widespread use of child labor, to say nothing of underpaid adult labor, came to most of us as a distinct surprise, followed by the shocking discovery that in an industrial society of which we had become so proud we were still using children in much the same way as the Victorian industrialists whom Dickens so accurately portrayed.

In an age when the 8-hour day, largely because of the publicity given it by labor organizations which had been successful in getting it established in certain industries, had seemed to most of us to be generally accepted, it was disturbing to learn that in most industries longer hours, hazardous, insanitary and otherwise unsatisfactory working conditions prevailed along with low wages and irregularity of employment. Although the tendency had been steadily downward in the length of the work day and work week, we were not aware that for the great majority of workers conditions had not been much improved, that the tendency to "let well enough alone" had successfully overborne most demands for social and economic betterment.

The lack of concern which most of us displayed in the problems and needs of others was characteristic of an era in which self-interest and the safeguarding of self-interest were looked upon as the key self-preserving qualities of men and women in a highly-individualized society. It was generally believed that every one knew best what was good for him and that, if this knowledge were supported by a sufficiently strong determination to see that he acquired it, everyone would be comfortable, content and prosperous. The fallacy of such an optimism, in the face of a standing list of some 8,000,000 persons unemployed in our "best" years, is a sufficient index to our ignorance and, perhaps, to our indifference.

The distress of the farmer was a subject that failed to interest most of us, unless we had something to sell him. We were all aware of the existence of a farmer class and of a rural community class dependent upon agricultural enterprise, but few expressed any interest in the adequacy of the farmer's income, few inquired whether his income exceeded a bare subsistence level and enabled him to purchase the products of industry.

No one knows to what extent all these and other factors contributed to the collapse of 1929 and, now that business has gone far on the way toward recovery, there is little interest in the subject outside academic circles. But there can be no doubt in the minds of thoughtful men that these and other conditions were largely responsible for the failure of our economic structure to withstand the shock it received six years ago when, one after another, the so-called "bulwarks" of our social fabric gave way under the strain of an unprecedented combination of destructive forces.

If we would prevent a recurrence of the hardships of the last half-decade—or, more conservatively stated, if we would reduce the likelihood of such a recurrence—then we must be prepared to remove some of the causes that brought them about. And if this means reform—and the conclusion seems inescapable—let us have the obviously-needed reforms without delay, let us face the task of altering fundamentally-fallacious conceptions unflinchingly, and let us continue our newly-acquired interest in the problems of others to the end that our reforms may be not only well-conceived but well-received.

It is our opinion that basic reform must precede any recovery, even if it is to be only relatively permanent. To attempt to reërect the old type of economic structure on the ruins that were left us is as chimerical a proposal as could well be imagined. We must incorporate in our building the scientific findings of the age in which we live; its foundation must be laid, its structure must be designed, to meet the needs of the future which we can visualize, not the needs of an age that has been outgrown. We must not tolerate in its construction any outmoded or outworn methods or ideas; we must insist upon timeliness, appropriateness, sufficiency. This will mean the casting aside of old prejudices, the avoidance of old errors, the discarding of mental fetters that have outlived whatever utility they may once have possessed. And that is the type of reform that we must be ready to demand and to accept.

Reform is not opposed to recovery; it is essential to it. We can have reform without recovery, reform of the wrong kind, reform undertaken with no proper conception of present and future needs. And we can have reform with recovery, reform that embraces the major sore spots in our civilization, reform that corrects the old evils by the application of prevention rather than belated remedy. But we can not have recovery without reform; we can have no lasting improvement without fundamental changes, which must be calculated not only to prevent the recurrence of old evils but also to prevent the incursion of new ones.

If we had to state this program in a few words, we should not say "Recovery or reform," as so many seem disposed to do, nor even "Recovery and reform," but rather "Reform for recovery." The terms are not antithetical, they are naturally associative, even conjunctive, and, what is more, they must be viewed in their proper cause-and-effect sequence.

The Growing Silicosis Menace

A RECENT silicosis suit in which it developed that the plaintiff did not know whether the disease for which he sought damages affected the eyes or the lungs has aroused some interest as evidence of the extent to which the so-called "silicosis racket" has developed. It is but natural that so profitable a field as the exploitation of the fears of business men through the filing of damage suits alleging disease on the part of a workman employed in a hazardous occupation should have attracted unscrupulous lawyers. And it is equally natural, in view of the exposure of numerous cases of that kind, that most damage suits alleging the contraction of silicosis or pneumoniocosis during employment should be looked upon by actual and potential defendants as attempts to extort money on spurious claims.

There are genuine cases of both diseases initiated and developed as the result of employment in or near lung-destroying dust; the truth is, there are many of them. Their number has increased alarmingly in recent years and unless something is done by way of prevention, they may become a very serious financial burden to industry, to say nothing of the social losses. The situation can not be met in anything but an attitude of expediency and self-deception, if industrialists adhere to the thought that all, or even most of, such claims are spurious. The situation is one that must be faced by recognizing, first, that both diseases exist; secondly, that they are caused and aggravated by the presence of siliceous and other dangerous dusts; thirdly, that the employer is responsible for the damage resulting to employees working in or around such dusts; and lastly, that there are means by which the dangers of exposure, disease and the resulting litigation can be greatly reduced.

The first two points are matters of fact which it is folly to deny, however great may be the number of ill-founded damage suits; their recognition requires a change of attitude on the part of many employers. The third factor is only too well known to those who have been forced to defend themselves in silicosis suits, whether these were based on facts or misrepresentations. The point mentioned last—namely, that there are means for lessening the hazards of silicosis and pneumoniocosis—is the one to which we direct the attention of employers.

On previous occasions we have said that the prevention of suits for alleged silicosis damage is more a matter of mechanics than of legislation—for some have sought the passage of laws relieving the employer from liability in silicosis cases. The installation of modern dust-collecting equipment, of which there are numerous efficient examples on the market, is the most effective means of stopping the growing number of silicosis damage suits. The use of such appliances reduces the exposure hazards, not perhaps to the minimum (which is a term of perfection and therefore unattainable), but at least to the point where it becomes extremely difficult, if not almost impossible, for a worker to contract the disease. In the few cases where the disease may develop, the employer when sued can point to his equipment as evidence of his desire to prevent, as far as technological development has made possible, the contraction of the disease by his employees. No more formidable disproof of alleged contributory negligence on his part could be set up; certainly there could be no more effective evidence of his interest in his employees' welfare for presentation to a jury.

We again urge upon employers the wisdom of studying this problem intently in cases where the danger is present and of examining all available mechanical means for stopping silicosis litigation before the foundation of a claim is laid.

Large High-Calcium Limestone Deposit Found in Northwestern Alabama

By EDWIN C. ECKEL
Chief Geologist, Tennessee Valley Authority

DURING the past year we have discovered a very important deposit of ultra-pure limestone within easy distance of Muscle Shoals, Ala. This deposit, the bulk of which has been bought by the Tennessee Valley Authority, is certainly the largest and purest limestone mass in the southern United States; it may indeed be the largest and purest anywhere in the country. I am saying this with full recognition of the purity and extent of the Michigan limestone properties in north Michigan, which as a matter of fact I examined before development and on which I made the report which was responsible for their original financing. Our own Sheffield property looks better to-day than did Rogers City at that time.

As usual with any such discovery, the whole story is in part a matter of good judgment and in part of sheer good luck. The T. V. A. was not in search of a limestone of the grade we actually found; it was in need of a low-magnesia limestone just good enough for the making of cement. The matter was turned over to the Geological Division of the T. V. A., and for freight and operating reasons search was commenced along the Tennessee River bluffs west of Sheffield, Ala. Sampling of these bluffs by my assistants, Messrs. Spain and Moneymaker, gave results which suggested that ample supplies of low-magnesia stone were there in good quarrying position, and that the average grade would certainly meet the 94 or 95 per cent. lime-carbonate content, which was the best that our old Waco quarry had ever been able to ship. Waco was perhaps the worst of the gold bricks which the government had accepted during the World War days; it lay 35 mi. from our nitrate plant, all the stone was under the mill level, and, aside from the prohibitive freight rate, working costs would have been high. Since $2,000,000 had been sunk there during the war, it was hard to throw it away and start fresh, but clear economic reasoning proved that the property at Waco could never compete with a river-bluff quarry.

Half a dozen limestone and shale tracts were optioned for the T.V.A. account, and then the original cliff-side sampling was checked and supplemented by diamond-drill work. The drill core samples showed that, though the original work was reliable, it had actually not showed the high purity of one great lens of stone. We found on platting the drill samples that this lens gave results such as those shown in the accompanying table.

Each of the records given in the table on this page covers a 10-ft. drill sample, and I have selected those published here from over a hundred available analyses.

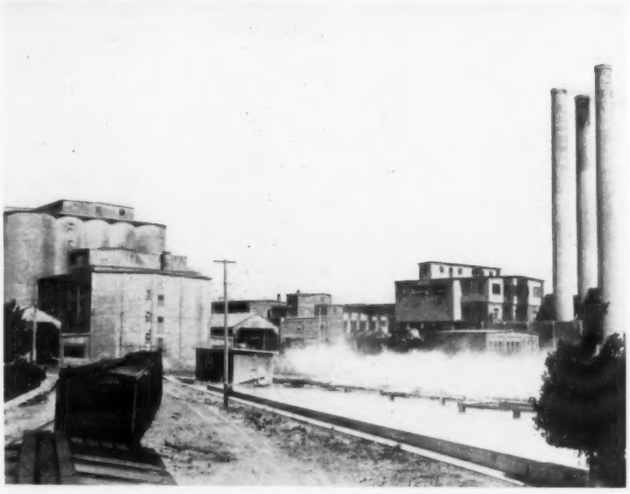
The bed which yields this stone, low in both magnesia and insoluble, is about 80 ft. thick at its eastern end nearest Nitrate Plant No. 1. Farther west it both thins and sinks lower in the river bluffs, so that an undesirable tonnage of high-silica stripping would become necessary. On the property finally selected and bought for the T.V.A. account there are some 5,000,000 tons of ultra-pure stone with less than 10 ft. of stripping. The whole operation can yield stone of maximum purity at very low cost.

Since the original plan to use this deposit as the basis for a government cement mill has been abandoned, the T.V.A. property rests as a great reserve of chemical stone, available for many possible industries based on Muscle Shoals power. We have used a small tonnage recently in making alumina cement and ferro-silicon at the Shoals from the hitherto worthless Mississippi bauxites. The cement and metal were made in an electric furnace with entire success and economy, and the silica-removal was so complete that alumina-cement carrying less than 1 per cent. of iron oxide and less than 2 per cent. of silica were made from bauxites carrying 30 per cent. each of silica and iron oxide. The future of this line of development seems promising enough at the moment, and it is hoped that private capital will undertake more extensive operations.

Aside from alumina cement the limestone of course will be a valuable basis for paper, carbide, ferro-alloy and other chemical and metallurgical industries. So far as extensions of the deposit are concerned it may be said that equally careful geologic work would doubtless demonstrate the existence elsewhere in the Mississippian series of similar pure limestone beds, but it is highly improbable that any new location can be found to present such advantageous quarrying and shipping conditions as the properties already owned by the Tennessee Valley Authority.

ANALYSES OF LIMESTONE SAMPLES, NORTHWEST ALABAMA

Silica	Alumina and Iron Oxide	Calcium Oxide	Magnesia
0.52	0.69	55.54	n.d.
0.20	0.40	56.00	n.d.
0.39	0.47	55.54	n.d.
0.30	0.44	55.78	n.d.
0.50	0.33	55.44	n.d.
0.48	0.33	55.54	n.d.
0.60	0.24	55.35	0.15
0.26	0.20	55.78	0.151
0.22	0.22	55.78	0.056
0.19	0.21	55.55	0.062
0.30	0.19	56.10	0.00



Wet-process plant of Oklahoma Portland Cement Co., Ada, Okla., with packing and storage buildings at left and spray pond in foreground.

Coolers, Filters and Waste-Heat Cement Plant Boilers Modernize

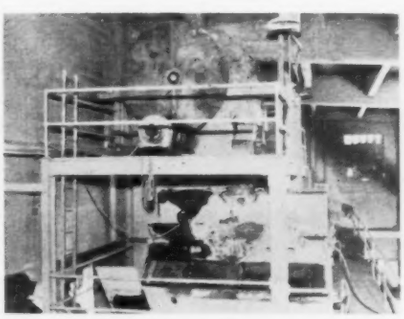
By W. E. TRAUFFER

UNDER the guidance of its president, Charles Boettcher, the Ideal Cement Co., Denver, Colo., has gained the reputation of being one of the most progressive producers in the cement industry. This company has expanded gradually until it is now one of the most important in this field. During "boom" times this expansion was largely in the form of new plants, the most recent being those at Boettcher, Colo., and Okay, Ark., which went into operation in 1928 and 1929 respectively. Since that time the company has devoted its efforts entirely to the improvement of its existing facilities, a phase of cement-plant expenditures formerly overshadowed by new-plant construction.

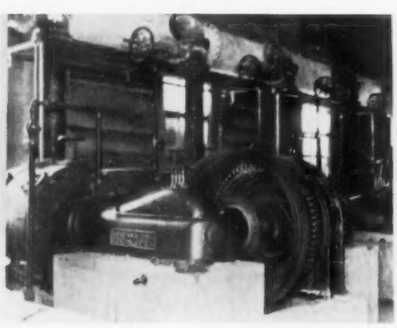
The series of important improvements made by this company to the wet-process plant of the Oklahoma Portland Cement Co., Ada, Okla., a subsidiary, over a period of years is typical of its policy. This plant has been kept abreast of modern cement-plant practice by an almost continuous program of improvements. The last few of these improvements have made this plant one of the most efficient and economical operations in its territory.

The original dry-process plant of the Oklahoma Portland Cement Co., at Ada, Okla., which was built in 1907, had two 7-ft. 6-in. by 125-ft. rotary kilns. Two additional 9-ft. by 125-ft. kilns were added in 1908 and 1911 and other improvements were made from time to time. This plant was shut down early in 1931 and has not been operated since.

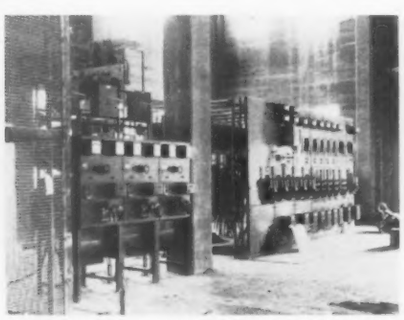
The wet-process plant, with which this article is concerned, went into operation in 1920 with one 10-ft. by 240-ft. kiln. A second kiln of the same size was installed in 1921 and an 11-ft. 3-in. by 10-ft. by 240-ft. kiln was added in 1922. The present steam-generating plant was installed in 1922 to 1923, and the pack-house and silos in 1924. In that year the capacity of the generating plant was increased to furnish power for both plants and the quarries. Late in 1931 three Hum-mer screens for closed-circuit raw grinding were added. The installation of Oliver slurry filters was begun in November, 1932, and they went into steady use in May, 1933. There was little delay occasioned by the installation of these filters, as the plant was operated up to March 20, 1933, the cement storage being filled at the same time that the filters were ready to be connected. This is the second filter installation to be made by the company, the first having occurred at the plant of the Arkansas Portland Cement Co., another subsidiary. Installation of the Lee reciprocating-grate clinker coolers was completed on July 28, 1934, and the Babcock & Wilcox



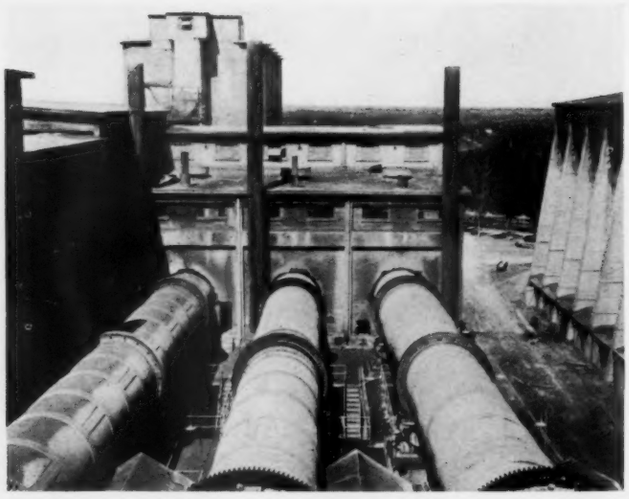
Vibrating screens which operate in closed-circuit with raw-grinding mills.



One of the three vacuum pumps used in connection with the slurry filters.



Switchboards which control the operation of the slurry filters and accessories.



The three rotary kilns viewed from the filter building. Raw-material storage building is at right.

waste-heat boilers will be in operation about March, 1935.

Ground was broken late in 1906 in the original quarry, which was operated steadily until 1926, when the supply of cement rock became exhausted. The present quarry, which was opened at that time, is about 800 ft. wide and 1,000 ft. long and has a face varying from 30 to 50 ft. in height. The amount of overburden is so small that it is not removed. The stone is somewhat stratified and the ledges are inclined at a sharp angle, making a somewhat difficult drilling and blasting problem. Blast-hole drilling is done with three Armstrong 6-in., electrically-operated well-drills. Shots are made with double-row staggered holes with a spacing of from 10 to 11 ft. From 45 to 50 holes are usually shot at one time. Hercules Gelamite No. 1, which is a 60-per cent. gelatin explosive, and Cordeau-Bickford safety fuse are used. Secondary drilling of large pieces is done with Ingersoll-Rand Jackhamers, and blasting caps are used for secondary blasting.

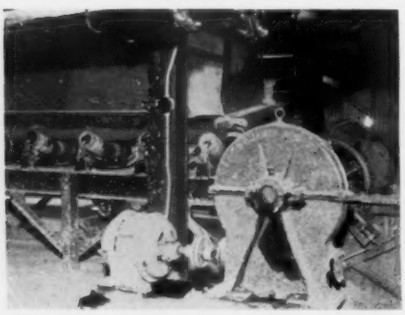
Quarry car in position to dump load into primary crusher.

Stone is loaded by a Marion 92 electrically-driven crawler shovel having a 3½-cu.yd. dipper and a Marion 76 steam-driven crawler shovel equipped with a 3¼-cu.yd. dipper. A Bucyrus 68 steam shovel is held in reserve. These shovels load the stone into Woodford 10-cu-yd. cars having steel-reinforced timber bodies. Five of these cars are used at one time and form part of a Woodford electric-haulage system which was installed in 1919. The cars are controlled from a station at the crushing plant, which is about ¾ mi. from the section of the quarry now being worked.

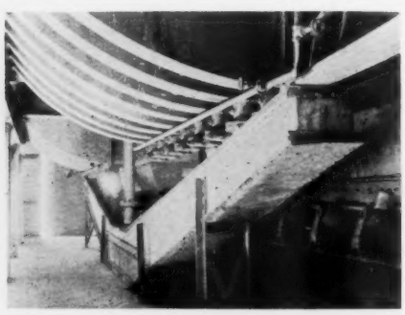
Quarry view showing two well drills and electric shovel loading remote-controlled quarry cars.

At the crushing plant the stone is discharged from the cars into the Traylor 36-in. by 72-in. Blake-type primary jaw crusher in which it is reduced to 8-in. minus. The crusher product is fed by a bucket-elevator to a revolving scalping screen, the oversize from which goes to a Williams No. 9 hammer-mill, which reduces it to 2½-in. minus. The product of the hammer-mill, together with the "throughs" from the scalping screen, go to another bucket-elevator which feeds two more revolving screens. The oversize material from these screens goes to a Williams No. 7 hammer-mill which reduces it to ¾-in. minus. This crusher also discharges to the elevator which feeds back to the screens. The material passing through these screens goes to a concrete storage-bin having a capacity of 350 tons. Stone is discharged from storage through bottom gates which feed it to railway cars for haulage to the cement plant, a distance of about 7 mi. Before this crushing plant was built in 1917 all the crushing was done at the cement plant. The crushing plant was also formerly used for the production of commercial crushed stone and some of the additional equipment is still in place although not in use.

The shale deposit from which the plant is supplied has been operated since the first plant was opened in 1907. The shale is



Speed-reducer drive of belt-conveyor feeding filter cake to one of kilns.

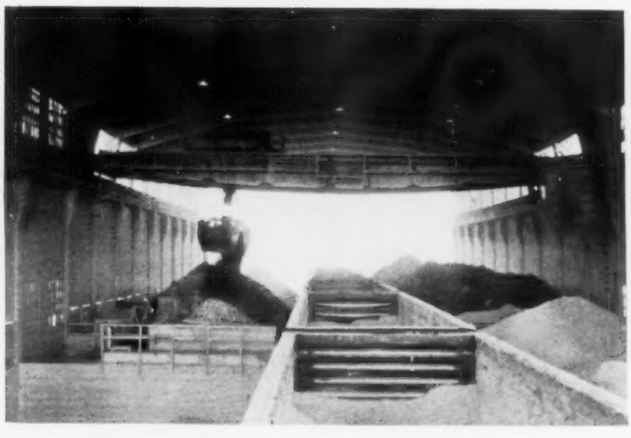


View of bottom of filters showing discharge of cake on kiln-feed conveyor.

loaded by a Marion 60 steam shovel into railway cars, which are hauled a distance of about 7 mi. to the cement plant. There the shale is reduced by a Williams hammer-mill before being sent to storage.

The cars of stone are run up an inclined track into the open-storage building which is 300 ft. long and 76 ft. wide and has a capacity of 32,000 tons of stone and shale. Here the stone is rehandled to storage by a Bedford 80-ft.-span overhead traveling crane handling a 5-cu.yd. clam-shell bucket. The shale from the hammer-mill is also stored in this building. Both materials are rehandled by the crane to storage tanks from which they are drawn in approximately correct proportions by a bucket-conveyor. The conveyor discharges the mixed shale and stone into 3 mill-feed tanks, which feed the three Allis-Chalmers 7-ft. by 26-ft. 2-compartment Compeb mills.

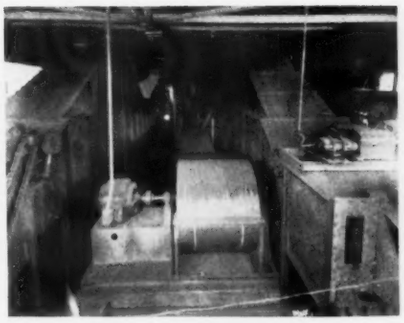
All the slurry from the first compartments of these mills goes by elevator to three sets of Hummer vibrating screens. The "oversize" from these screens is chuted back to the feed ends of the mills, while the "throughs" are fed to the second compartments. The mills discharge the finished slurry into a mixing tank. One of the mills is used part of the time for grinding shale or stone alone, these being stored in batch tanks from which they can be fed to the mixing tank in the required quantities



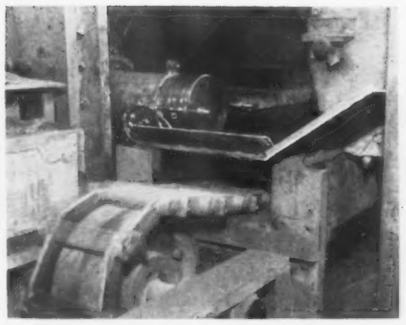
Overhead crane unloading stone from cars to storage. Compartments from which raw-mill feed is blended are at left.

to correct the slurry. Three bucket-elevators feed the slurry from the tank to the Ferris-wheel feeders of the filters.

The filter installation consists of six 12-ft.-diameter, 8-disk Oliver American filters, two for each of the three kilns. Each filter is driven by a 3-hp. d.-c. variable-speed motor through an Oliver-Foote speed-reducer having a ratio of 1,095 to 1. The vacuum for the filters is created by three Ingersoll-Rand Type XRE, 24-in. by 10-in. vacuum pumps driven by 100-hp. direct-connected motors. When



Discharge ends of the two traveling-grate clinker coolers.



Discharge end of one of coolers showing feed to drag-chain conveyor.

Automatic centralized lubricating system on drive of one of kilns.

all the kilns are running, only two of these pumps are required, the third being held in reserve.

The slurry fed to these filters has a fineness of 91 per cent. through 100-mesh and 84 per cent. through 200-mesh, a moisture content of 40.9 per cent. and a temperature of 90 deg. F. The filter cake formed is from $\frac{3}{8}$ in. to $\frac{1}{2}$ in. thick and has a moisture content of 21 per cent. Under these conditions the filters have a capacity of .637 bbl. per sq. ft. of filter-surface area.

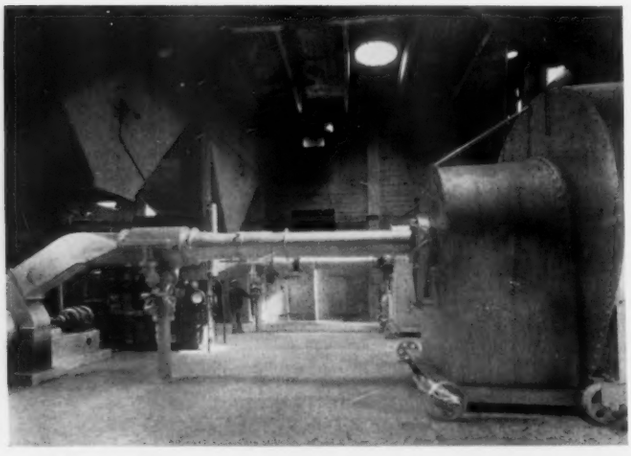
As in other installations, the filter cake from each filter is discharged on a belt-conveyor, each of the three conveyors being driven through a D. O. James worm-gear speed-reducer. These conveyors discharge to three Kronstadt-type feeders, which feed the gas-fired three Allis-Chalmers rotary kilns. Each of these is 240 ft. long, two are 10 ft. in diameter and the third 11 ft. 3 in. and 10 ft. These kilns had a combined capacity of 6,120 bbl. of clinker in 24 hr. with the filters alone and were

Another view of plant with waste-heat-boiler building near completion. Raw-material storage building is at right.

operated at a speed of one revolution in 75 to 80 sec. They were fired with natural gas and consistently showed a fuel rate of 1,667 cu.ft. of gas per bbl. of cement produced. Under these conditions the exit gas had a temperature of 1,300 deg. F. The power required for operating these kilns was 1.47 kw. per bbl. These figures compare with the former total kiln capacity of 4,500 bbl., in 24 hr., a fuel consumption of 2,200 cu. ft. per bbl., and a power ratio of 1.59 kw. per bbl. before the filters were installed under similar conditions. The higher kiln speed required with the filters was attained by installing larger motors and making a few minor changes.

The kilns formerly discharged the clinker into three 8-ft. by 70-ft. rotary coolers from which it was discharged to a series of handling machines, comprising a belt-conveyor, a bucket-elevator and a bucket-conveyor which distributed the clinker to 10 circular clinker-storage tanks and their 4 interstices, which have a combined capacity of 100,000 bbl.

The two Lee Process clinker coolers further improved the performance of the two kilns affected. These coolers are of the same design as those which



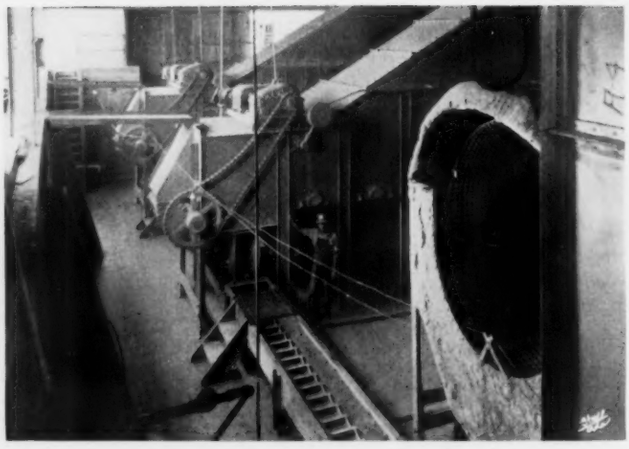
The firing floor, showing kiln-discharge hoods connected to the coolers. One of the new blowers is at left.

have been installed in several other cement plants except for a few minor improvements which have been developed since.

Each cooler is driven by a 5-hp. motor through a Palmer-Bee speed-reducer and each unit has a main fan that supplies the air to the processing and final cooling chamber. These fans were built by the American Blower Co. and are powered by 125-hp. G. E. motors. The primary air, which is taken from the jacket of the machine, is supplied by special American blowers powered by 50-hp. G. E. motors.

The kilns discharge the clinker direct to the coolers which in turn discharge it to a drag-chain cross conveyor also furnish by Lee. A new bucket-elevator feeds the clinker to equipment which takes it either direct to the mills or to the clinker-storage tanks previously described. The drag-chain conveyor is driven by a 7½-hp. G. E. motor through a D. O. James speed-reducer and chain.

These coolers reduced the natural-gas consumption on these two kilns about 300 cu.ft. to about



The two traveling-grate clinker coolers discharging on drag-chain conveyor. Old rotary cooler on third kiln is at right.

1,366 cu.ft., at the same time increasing the kiln capacity from 82 to 98 bbl. per kiln-hr., or about 12 per cent. Because of the short time in which these coolers have actually been operated, these figures are only tentative and are gradually being bettered. The exit gas temperatures have been raised 100 deg. to 1,400 deg. F., this increase contributing greatly to the efficiency of the waste-heat boilers which have since been installed. The kiln primary air is now about 280 deg. F., compared to former near-atmospheric temperatures. Much of the present fuel economy of the kilns can be attributed to the fact that the secondary-air temperature is now about 1,500 deg. F., a considerable increase over the former figure.

The clinker is now discharged from the coolers at a temperature of 125 deg. F., compared to the former figure of over 300 deg. Formerly water was also used on and in the rotary coolers to reach even that figure. The improved grinding characteristics of the clinker have increased the output of the finish-grinding mills 5 bbl. per mill-hr. with some increase in quality, early strength, etc., as well. It has also been found that the new coolers caused considerably less lost time due to shut-downs and

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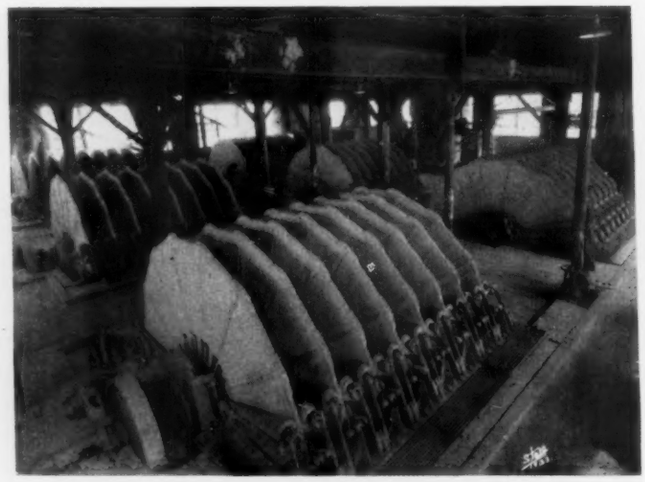
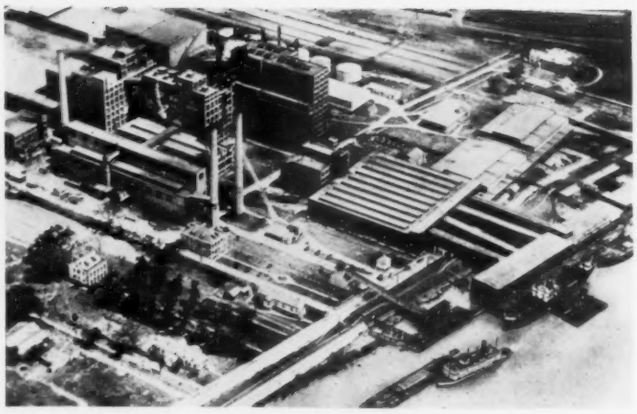
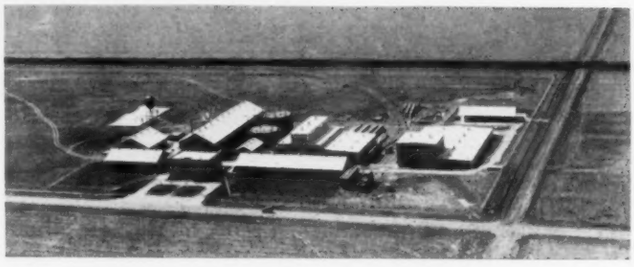


The disk-type slurry filters installed at the plant of the Oklahoma Portland Cement Co.





Left: A huge sugar refinery at New Orleans. *Below:* The Government's helium plant at Amarillo, Tex.

Merchandising Principles for Lime Salesmen

By SIDNEY P. ARMSBY

THIS is the second and concluding installment of Mr. Armsby's article dealing with principles to be observed in selling chemical lime. In this portion, Mr. Armsby points out, among other things, the need for technically-trained salesmen and the necessity for close coöperation between the selling and production forces.

FUNDAMENTAL principles governing the conduct of the world's business, just like human nature itself, do not change as time goes on. And one of these fundamentals is the fact that ways and means of accomplishing business results are constantly changing. The laws of chemistry do not change, but new applications of these laws are being developed every day, for the sole purpose of forging new tools with which to accomplish the world's work. New industries are constantly being built up, and new processes are the order of the day, each new development seeking to promote the welfare or increase the comfort of the human race. What we call "progress" is really nothing more than the result of a continual striving for greater industrial efficiency.

These new applications of old chemical principles naturally involve the use of chemical reagents, one of the most important of which is the material in which you are vitally interested—chemical lime. Whether or not you do anything about it, the field of usefulness of your material is constantly being enlarged and the number of its possible applications is always on the increase. The process industries are continually developing new ways and more economical methods of producing their products; new products are being perfected and manufactured; and lime is utilized in many such operations by reason of its peculiar chemical and physical properties and their wide applicability to manufacturing processes. It is used as raw material, neutralizing agent, precipitant, and in countless other ways. Many patented or tentative new processes depending upon it for their efficiency or possible utility are or will be made available.

To mention just a few specific instances of such recent developments: (1) A study made at the United States Bureau of Standards shows that the efficiency of lime to be used for making bleaching powder is affected very materially by the presence or absence of excess moisture in the hydrated lime used. (2) Another entirely new method of manufacturing bleaching powder, which is intended to reduce costs and improve the quality of the product, depends for its efficiency upon certain physical properties of the lime employed. (3) Various magazines have carried articles dealing with recent advances in methods of treating municipal sewage in which lime plays an exceptionally important part. (4) United States patents Nos. 1,794,551 to 1,794,553, inclusive, relate to new methods of extracting potash from its salts, and lime is necessary in the process. (5) Lime has been shown to be of value as an ingredient of acid-resisting enamels, because of its effect in increasing the expansion coëfficient of the enamel. (6) The calcium salt of malic acid is now used as a precipitant for tartaric acid in the artificial aging of wine. (7) Articles of my own have discussed several recently-developed processes

employing lime in the refining of petroleum products.

And so it goes on continually, new uses and additional data being constantly brought to the attention of those who produce and those who use lime for either primary or incidental operations affecting our daily life and well-being. Even the information that a large majority of the bathing beauties who have won the title "Miss America" came from cities that use a lime-softened water may be the means of strengthening a sales argument in favor of lime. Not to mention the fact that quicklime has been put up in metal capsules and used to curl the hair of both "Miss" and "Mrs. America."

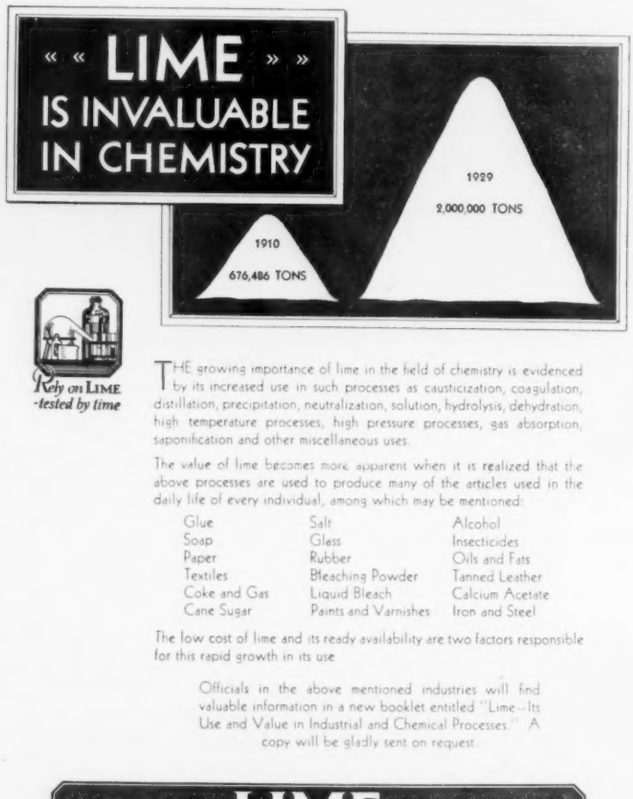
All which leads to the conclusion that, if you would secure your share of the constantly-increasing lime tonnage that is being made possible, you must keep yourself informed of new developments involving the applications of lime, study the specific requirements indicated in each case, and apply the knowledge thus gained to the production and sale of products that will meet such requirements. The tonnage possibilities are there, and if you do not help to develop them, somebody else will. Above all, do not lose sight of the fact that *a business depression promotes the development of ideas and methods directed towards the lowering of production costs, and stimulates the search for more economical processes and materials.*

Employment of Technically Trained Salesmen.—No good salesman need be afraid to undertake the sale of chemical lime, but the more he knows about it the more efficiently he will be able to handle it. He does not necessarily have to be a graduate chemist, nor does he have to know all the chemical reactions involved when lime is used in a certain way or in a specific process. He should, however, have a thorough understanding of the fundamental functions which lime performs, and should know what properties or characteristics affect its value for various operations. With this knowledge at his disposal he can talk intelligently to the user of lime, explaining, for example, that his lime is desirable for water-treating because it has a high percentage of available lime and because its settling rate is slower than its rate of solution or reaction. Or he may be able to show that its high neutralizing power and its freedom from harmful impurities make it economical for some particular manufacturing process.

In addition to this, he should be "industrially-minded." By this I mean he should be able to grasp quickly the fundamentals of an industrial process and to understand what materials are being processed; what changes take place between raw material and finished product; what reagents are employed; and where and why lime fits into the flowsheet. He need not know just what type of still or mixing kettle is used, but if he knows that lime is added to the semi-finished product in the still in order to cause a certain change in the composition of the batch, he is vastly better off than the man who sees nothing but a confused tangle of gears, tanks and other mysterious equipment, and has no conception of what it is all about or of what the lime is supposed to do. Most chemical-manufacturing industries are operated and directed by technically-trained men who appreciate the lime salesman who can intelligently apply his knowledge of lime to their problems with confidence and without wasting time.

The right type of salesman, who has been correctly informed as to the merits and utility of the lime he is selling, will establish valuable contacts with "key" men in the industries being served, will locate and develop new applications for lime, will meet competition intelligently and efficiently, will render a real service to your customers, and will be a decided factor in securing the right kind of recognition for the lime industry in general and for your company in particular.

It is also worth remembering that a real chemical-lime salesman keeps constantly in touch with new developments, studying new processes and investigating prospective as well as actual applications of lime. Especially during times of business depressions, such a man may be very valuable by coöperating with plant operators who are perfecting some new and economical production method that will later be put into operation with a consequent new outlet for lime. By thus building for the future it is often economical to retain such a man during a dull business period rather than to lose contact at a time when important tonnage outlets are in the making. A new man, taken on after such new processes are in actual operation, is handi-


« « LIME » »
IS INVALUABLE
IN CHEMISTRY
1929
2,000,000 TONS
1910
676,486 TONS
Rely on LIME
-tested by time
THE growing importance of lime in the field of chemistry is evidenced by its increased use in such processes as causticization, coagulation, distillation, precipitation, neutralization, solution, hydrolysis, dehydration, high temperature processes, high pressure processes, gas absorption, saponification and other miscellaneous uses.
The value of lime becomes more apparent when it is realized that the above processes are used to produce many of the articles used in the daily life of every individual, among which may be mentioned:
Glue
Soap
Paper
Textiles
Coke and Gas
Cane Sugar
Salt
Glass
Rubber
Bleaching Powder
Liquid Bleach
Paints and Varnishes
Alcohol
Insecticides
Oils and Fats
Tanned Leather
Calcium Acetate
Iron and Steel
The low cost of lime and its ready availability are two factors responsible for this rapid growth in its use.
Officials in the above mentioned industries will find valuable information in a new booklet entitled "Lime—Its Use and Value in Industrial and Chemical Processes." A copy will be gladly sent on request.
NATIONAL LIME ASSOCIATION
An organization of leading lime manufacturers formed to encourage a better appreciation of the economic value of lime in all its uses.
WASHINGTON, D.C.

One of effective advertisements used by the National Lime Association in its lime-publicity campaign.

capped by having to go back and repeat the groundwork of the other man, and by the fact that some other brand of lime may have been used in making test runs or laboratory studies, thereby prejudicing the customer in its favor. The work of your technically-trained salesmen is, by its very nature, a vitally important part of your development program and, inasmuch as the possible uses for your product are constantly on the increase, it is highly desirable that you maintain this phase of your general promotion work to the fullest possible extent.

Coöperation of Sales, Production and Technical Departments.—As explained in the first of these articles, you can not produce a satisfactory chemical lime unless you know the chemical and physical properties that will render it acceptable, and you can not sell it intelligently and effectively without an understanding of its utility. These two facts automatically call for a free exchange of ideas between those who are concerned with the manufacture, classification and sale of your products, and the vital importance of such coöperation very quickly manifests itself to anyone who attempts to serve the chemical-lime trade.

Your laboratory may find that the nature of your raw material makes it suitable for the production of some entirely new grade or quality of lime product, not previously made in your territory but of value in certain chemical-manufacturing processes. Before trying out the production of this material in the plant, however, it will be well to make a sales survey, which may possibly reveal the entire absence of a market for such a material in your trade territory. Perhaps your sales department finds that a demand exists for a definite tonnage of a certain grade of lime which you have not heretofore attempted to produce. By waiting till the laboratory has determined the feasibility of producing the required product, and then allowing the production department to determine the manufacturing costs involved, the sales manager may avoid ill-advised or unprofitable sales effort. Under other conditions, of course, a similar course of action may be the means of developing an exceptionally-desirable market that could not have been reached otherwise.

Whenever new products have been developed and their value indicated, it is very necessary that salesmen be instructed as to the proper way to handle the sale of the new material. Here the technical director may well act as a sort of tutor for the salesmen, explaining to them the properties of the material, the industries in which it may find application, and the functions it should perform. Or he may assist the sales manager by consulting with prospective customers and discussing with them the merits of the new product. At the same time he may also be able to offer valuable suggestions for reducing manufacturing costs when the plant is making the new product. Thus, he can help to secure the maximum efficiency from both the manufacture and the sale of your products.

Every day spent in selling chemical lime brings some new illustration of the fact, already mentioned, that if you are to be successful in serving the chemical industries in your territory, you must also *make your business a chemical-manufacturing operation.*

Honest Service at All Times.—The sale of chemical lime—generally to technically-trained men who are conscientiously devoting their efforts toward the improvement of their own processes—offers many striking proofs of the fact that the honest way of doing business is the easiest way, and at the same time the most profitable. If you merely accept the orders that are sent to you, without doing anything more than to say "thank you," your customer is bound to feel that you are indifferent to any problems he may have when using your lime, and you will have no right to complain when he transfers his business to someone else. If, instead of adopting such a passive, disinterested policy, you make an honest effort to promote your customer's best interests—by helping him to make the most effective use of your lime—his attitude is bound to be entirely different, and you will find your relations with him much more satisfactory and profitable in the long run. If he is convinced that you are really trying to give him a dollar's worth of service for every dollar he spends, there is not the slightest doubt that you will win his confidence or that you will secure all the lime business that he is justified in giving you.

It may happen that, in developing some new account or soliciting the business of some large industrial plant, you will encounter an unexpected and apparently-unexplainable opposition to the purchase of your material or to the adoption of the new processing ideas you have advanced. This does not mean that the purchasing agent is susceptible to "handling," nor does it indicate that "confidential arrangements" will be successful in securing the business. In fact, any attempts to secure an order by such means will probably kill all your chances of obtaining repeat orders, because the customer is just as smart as you are and he knows that if you offer him something for nothing you may be expected to make up the difference by furnishing an inferior grade of material, or by giving poor delivery service or by "skinning" the job in some other way. And even if you should succeed temporarily in "buying" such an account, you will not be in position to complain if someone else outbids you later on.

If you have offered a really constructive idea which you are prepared to back up by the service and the material you can deliver, and you still do not seem to make progress in securing at least a trial order, the chances are that there is a very simple explanation for the delay. Probably some individual in the organization is responsible for holding down production costs in the particular operation that would be affected; has devoted years of effort and all his technical knowledge to the perfection of his operating methods; has reduced his costs to the lowest possible figure with the materials he has had available; and is not willing to risk any changes that, for all he knows to the contrary,

may possibly result in a lowering of efficiency. Such a man is honestly striving to protect the interests of his company and, just because of this honesty, he will become your best friend and staunchest supporter if and when you succeed in demonstrating to him the merits of your material or the value of the new process idea you have developed. He is the "key" man, and if you sell him, you may rest assured that the account will stay sold. Cultivate his acquaintance; convince him that you are sincere in your efforts to render him a service; demonstrate your idea and your material to him; coöperate with him in studying the problem from his viewpoint; give him plenty of time in which to investigate for possible flaws in your argument; and then just leave the rest to him, with the assurance that his findings will be unbiased and will establish the real merits of your case, in addition to which he will become one of your strongest "boosters" both within and outside his own industry.

I have personal knowledge of many instances where such conditions existed and in every case where the lime manufacturer was sincere in his efforts to serve the customer's best interests, he was satisfied with the results obtained. In one case a tentative project, involving some radical changes in lime-handling procedure and the installation of several new process operations, was under consideration in a large plant that had been using lime for years. The "key" man in this case held up matters for several months, took issue with every claim the lime manufacturer made, refused to take his word for anything regarding the feasibility of the project, retired to the plant laboratory to test out all possible flaws, and then put his findings on record in a report to his board of directors. This report stated that the project was not only practicable but would show a definite and substantial saving in manufacturing costs; that the particular lime manufacturer involved was "the first one in twenty years who had done anything except fill orders and say 'thank you'"; that his lime was exceptionally well suited to their operations, and that, "in view of the constructive and valuable information given" regarding the more efficient use of lime, they owed it to this manufacturer to give him all their lime business.

Support of Your National Association.—Lime is one of the most versatile and economical of all the chemical reagents employed by modern industry and is, as you are well aware, used in an almost endless number of ways and for a great variety of purposes. Just because of the variety of functions which lime performs, and also because of its low unit cost, it is continually receiving the attention of a host of chemists, engineers and others engaged in developing and improving all types of industrial and manufacturing operations. As pointed out above, new applications for lime are constantly being developed, usually by persons outside the lime industry, and—because for every lime manufacturer there are literally thousands of actual or prospective lime consumers—it is obviously impossible for any one producer to know and understand all the demands made upon the industry. It is certain that every lime producer has sold a great deal of lime that was used in operations about which he knows little or nothing, and a great many people have bought lime without knowing whether or not it was of the best grade or quality for their use. And it seems evident that, as more new uses for lime are developed, this condition of "blind" buying and selling will become worse instead of better, unless something is done about it.

What can be done? The answer is coöperation—between lime manufacturers themselves, and between the lime industry and lime consumers. The petroleum industry, the water-treating fraternity, the leather manufacturers, the paper makers, the sugar producers and many other lime-consuming industries have their national or international organizations and research agencies, by means of which they exchange information concerning the materials they make, buy or sell. One thing such agencies study and discuss is lime, with the result that in most cases they really know more than you do about the kind of lime that is best suited to their

(*Continued on page 38*)

A small portion of the country's output of sulphur, in the production of which lime is extensively used.

The new cement-handling and batching plant of the Superior Ready-Mixed Concrete Co. Truck mixers are first loaded with aggregates under silos in background.

Concrete Producer Installs Bulk-Cement Handling and Batching Units

A STRONG trend toward the widespread adoption of centralized batching and truck-mixing has been observable in the premixed-concrete industry during the last few years. The main reason for this is the fact that most of the premixed concrete produced during this period has been used in the construction and repair of streets, highways and sidewalks and in public-utility and other construction work necessitating comparatively long hauls. For this reason, also, most of the new plants built have been located outside large cities, contrary to former practice which favored the location of central-mixing plants as close as possible to large urban and industrial centers because they received most of their business from private building construction.

Outstanding among plants of the type mentioned is that of the Superior Ready-Mixed Concrete Co. at St. Bernard, O., a suburb about 5 mi. north of down-town Cincinnati. This company has been producing concrete at this location for many years, batching aggregates by weight and adding sacked cement before loading them into the truck-mixers. In the new arrangement, which went into full operation in October, 1934, a pneumatic system for handling the cement, and two new cement-storage and batching units replaced the old system of cement handling. One of the new units has a single-compartment bin with a storage capacity of 1,500 bbl. of cement and the other has two compartments with a combined capacity of 600 bbl.

Sacked cement in cars standing on a trestle alongside the plant was formerly unloaded on a gravity roller-conveyor which was arranged in two sections and discharged on the batcher floor. Here the sacks were stored and dumped by hand into the batchers. This arrangement is now being used only for certain types of special cement for which the demand is small.

Aggregates are received in cars or trucks and are discharged into a hopper from which a belt-conveyor takes them to a Heltzel steel-inclosed chain-bucket-elevator operating on 60-ft. centers. This was installed shortly before the new batching units were

Some of the 11 truck-mixers operated by the Superior Ready-Mixed Concrete Co.

erected. The material from this elevator is chuted either direct to the first of three 500-cu. yd. concrete storage-silos or to a shuttle belt-conveyor which feeds either of the other two silos. The three materials stored are 1½-in. and ¾-in. gravel and sand. These materials are fed either by gravity or by means of belt-conveyors to the weighing batchers.

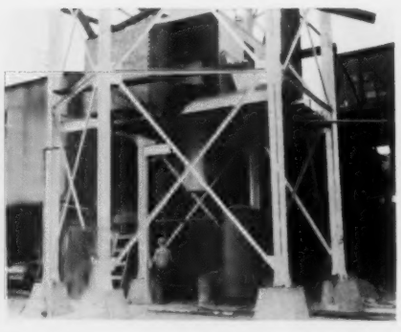
Bulk cement is now received in special cement cars or paper-lined box-cars which are "spotted" on the trestle mentioned above. Cement is unloaded from the cars by a special scraper and is discharged by gravity through two spouts to the cement-conveying system below. One of these spouts is located between the rails for unloading from bottom-discharge cars and the other alongside the track for unloading from regular box-cars. Both spouts converge and discharge through a common opening.

The Robinson air-activated conveying system used to raise the bulk cement to the new storage units is new to the commercial premixed-concrete industry, although it has gained wide acceptance in the handling of cement and other pulverized materials in other fields. The system consists of a pressure tank—in this case 6 ft. 10 in. in diameter and about 7 ft. long—with an air-operated cut-off gate which shuts off the cement when the desired amount has entered the tank. Compressed air from a receiver near the tank then enters the tank through an air valve leading to an inlet manifold and air jets and aërates the cement sufficiently to make it fluent. After sufficient pressure has been built up in the tank a valve on the conveying line is opened and the aërated-cement begins to flow through the line. A small volume of air, continuously admitted to this line through another valve slightly beyond the first, forces the fluent mixture of air and cement through the line to storage. At the end of the operating period all these valves are closed and another valve is opened to relieve any pressure existing within the tank before recharging. All these operations are controlled by one man from a panel at the tank. This installation handles about 40 bbl. of cement in each batch and can easily handle 360 bbl. per hr. under normal conditions on 150 cu. ft. of air per min. at 40-lb. pressure. Air is supplied by a compressor already installed and is passed through a dewatering cylinder before going to the conveying tank.

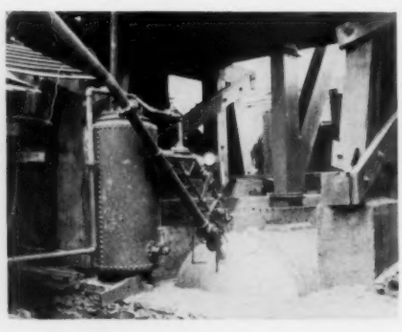
The 4-in. conveying line from the tank is split into three lines with a valve control allowing the discharge of cement into the 1,500-bbl. bin or into either one of the two compartments of the 600-bbl. bin. Each bin is circular in cross-section and has a conical bottom. It is of steel-plate construction and is supported on a structural-steel framework and concrete foundations. The bottom of each bin is about 19 ft. above ground-level, giving ample head room for batching the cement and loading the trucks and the clearance between columns is 11 ft. Each bin has an inspection man-hole on the top and a standard air-filter which consists of eighteen 6-in. by 6-ft. filter bags suspended in an inverted position in the filter housing. This is connected by a ¼-in. compressed-air pipe-line to the operating platform which operates a shaking device in the filter and causes the collected cement to drop back into the bin. The filter was supplied by the Dracco Corp. These two bins are located close together in order that the single roadway may diverge and a branch pass under each bin, converging again beyond the bins.

Cement is discharged from the bins through lever-operated Heltzel tubular valves into Heltzel weigh batchers, one for each of the two units. Above each valve is a roller-bearing sliding cut-off gate operated by a hand-wheel which may be used to shut off the flow in an emergency. Only one set of valves is used under the 1,500-ton bin but two, one for each compartment, are used under the 600-ton bin. The weigh batchers are equipped with Foundry Supplies Mfg. Co. electric vibrators to insure complete discharge of their contents into the trucks. Each batcher has a Howe 4,000-lb. double-acting beam scale, which registers both the correct batch and empty hopper, and two over-and-under dials to insure accurate control. One dial records the correct batch in the hopper and the other records when the hopper has completely discharged. A heavy canvas diaphragm connects the bottom of the charging valve to the top of the weighing hopper. A patented Heltzel pressure vacuum and dust-relief system conveys all dust created by the batching operations back into the cement storage through a pipe. This pipe also acts as an equalizer for the pressure created in weighing cement and for the vacuum created by discharging it. On each batching floor is a Jaeger siphon-type water-tank.

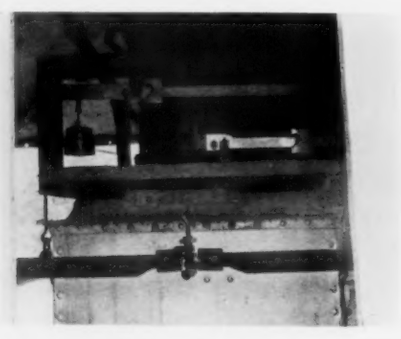
(*Continued on page 39*)



Close view of one of the two new bulk-cement-batching units.



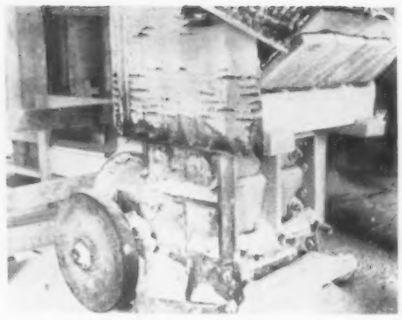
The air-activated cement-conveying unit with compressed-air receiver at left.



Batcher and beam scales in one of the new cement-batching units.

The plant with the cableway tail tower and vertical kilns.

Working with drifter drill in new limestone mine.



Hammer-mill installed for the reduction of quicklime.

Virginia Lime-Plant Cableway Transports Rock From Mine Across River

Improvement Program Also Includes Installation of Other New Equipment

THE James River section in western Virginia has for many years been an important center of lime production. In recent years there has been considerable activity in the construction of new plants and the improvement of old plants. Among the important recent developments was the rebuilding by the Virginia Lime Products Co., Inc., of its main plant on James River at Eagle Rock, Va. This company on June 1, 1933, took over the two plants of the Moore Lime Co., at that location, and almost immediately started on an improvement program. This included the construction of a long cableway, the opening of a new mine, and the installation of a new hammer-mill, crushers, and other equipment.

The deposit consists of 40 acres of high-calcium limestone with a 25-ft. cap of dolomite, on the south side of James River, directly opposite the company's plants. Stone is being obtained on this property by both open-cut and mining methods. In the quarry drilling is done with jackhammers. Stone for lime manufacture in the old plant is loaded by hand. An Erie steam shovel loads cap rock for the aggregate plant. Motor trucks haul it a distance of about ¾ mi. to these plants, crossing the river on a highway bridge.

The stone being obtained by mining methods averages over 98 per cent. calcium-carbonate content and is used for lime manufacture in the main plant. Headings and benches are driven with drifter drills. Loading is done by hand into cars which dump into the tramway bucket. Compressed air for the drills is carried across the river from a Sullivan compressor at the plant through a suspended air-line.

The cableway has a 1,250-ft. span and has a 4-ton bucket of the regular dump type. All the cable was

The plant and cableway across the James River as seen from the new mine.

The old plant of the Virginia Lime Products Co., also viewed from across the river.

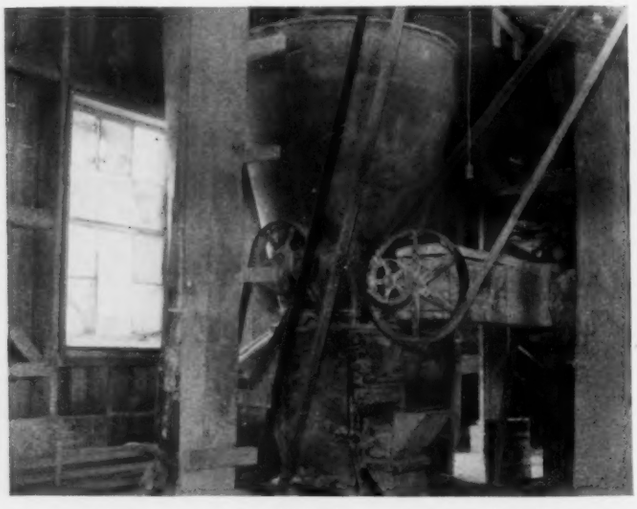
supplied by the A. Leschen & Sons Rope Co., the main cable being of the 2-in. lock-type. The Lidgerwood Mfg. Co. designed the cableway and supplied the double-drum steam-driven friction-type hoist which operates it. About 12 loads per hr. can be carried on this cableway, which dumps direct into the kilns.

Each of the two vertical-shaft kilns has a capacity of 13 tons daily. They are of the usual type with firebrick lining and their contents are drawn by hand. Large pieces are sledged and the spalls are removed by hand-picking. A Butterworth & Lowe vertical-type crusher reduces the lime for quicklime sales to pebble size. An elevator feeds a screen which discharges the quicklime into a bin from which it is loaded into barrels or in bulk into boxcars.

Quicklime for the hydrating plant is fed to a second Butterworth & Lowe crusher which is equipped with a breaker and burr. A bucket-elevator feeds the product to a bin of 100-ton capacity. Hydrating is done by a Clyde batch-type hydrator with a capacity of 5 tons per hr. The hydrated product is then passed through a Raymond No. 0 combination impact pulverizer and cyclone separator which is connected to a blower of the same make. Finished hydrated lime is stored in a bin feeding a 2-spout Bates bagger. A Gruendler pulverizer has also been installed for use in pulverizing the quicklime stored in the 100-ton bin.

The crushed-stone section of this plant has a capacity of about 25 tons per hr. The equipment includes a No. 5 Austin primary gyratory crusher, a No. 4½ Traylor Bulldog secondary crusher, elevators, and revolving screens. The original 3-kiln plant was built 45 years ago. Quicklime only is produced and this is sent by trucks to the main plant to be hydrated when desired.

In addition to quicklime, hydrated lime, and various grades of chemical lime, the company also produces "Lim-Osil," a waterproofing admixture for concrete. The company owns about 20 houses which it rents to employees at very low rates. Garden plots are supplied free of charge. It also owns and operates the Eagle Rock water-works.



The combination impact pulverizer and cyclone separator in the rebuilt plant.

Selling Chemical Lime *(from page 34)*

work, in addition to which they also know more about the desirable qualities of the products they make. To illustrate specifically, the average oil refiner knows more than you do about your oil and grease requirements and he also knows more than you do about his lime requirements. (This is true, of course, only if you are an "average" lime manufacturer.) How, then, can you apply the ideas discussed in this article, and profit by doing so? You can do it by adopting the same policy of coöperation which your best customers have found advantageous. In other words, you can actively support the National Lime Assn. and broaden its scope of activity.

Properly supported, such an organization acts both as a research and publicity agency and as a clearing house for information regarding the uses of the material involved. An individual lime producer, devoting his best efforts to the task, can really find out very little about the technical applications of lime without help from somebody. Two such producers who exchange information and data can learn a little more, and all the lime manufacturers in the country could learn a great deal more if they would pool their information. The national association can most economically investigate technical problems, tabulate accumulated data and experience, disseminate authentic information, and otherwise raise the standard of service which the industry gives to its customers.

An association field man can frequently secure interviews and discuss operating problems where a company representative can not. He can ascertain technical requirements and give worth-while information, or perhaps discover and investigate new and profitable uses for lime that would otherwise not be developed. He is unbiased in his efforts to promote the general interests of your entire industry, and the benefits of his development and promotional work are available for your use on any and all occasions. A lime customer dealing with an authorized representative of the entire lime industry will be assured of receiving the best service that industry has to offer, will appreciate the mutual benefit to be derived from a complete exchange of information, and will generally welcome the active coöperation of the properly-qualified lime manufacturer who is, in actual fact, one of the employers of the association.

Your national organization is working for you all the time, and it gives you the industrial standing, the authority and the technical and practical knowledge and coöperation that will enable you to serve your customers most effectively and profitably. If correctly utilized, it will be of tremendous assistance to you in establishing and maintaining contact with any industry in your territory for the purpose of really *selling* chemical lime.

Cement Plant (from page 30)

that the better control of the primary and secondary air resulted in better burning conditions.

The recording and control equipment is unusually complete. A Foxboro meter records and controls the amount of secondary air going to each kiln and another records its temperature. The gas volume is controlled by a Merco-Nordstrom valve, and a U-tube is calibrated to correspond to the temperature of the air. Another gage records the gas pressure.

The same bucket-conveyor reclaims the clinker from storage and discharges it into three finish mill-feed tanks. The same conveyor carries gypsum to separate feed bins. Screw feeders proportion the clinker and gypsum and discharge them into the three finish-grinding mills, which are also Allis-Chalmers 7-ft. by 26-ft. 2-compartment Compeb machines. Each of these mills and each of the three raw-grinding mills is driven by a 500-hp. Allis-Chalmers synchronous motor through a Cutler-Hammer magnetic clutch. The finished cement is conveyed to and distributed among the storage-silos by a series of screw-conveyors and bucket-elevators. There are twelve silos, each 35 ft. in diameter and 80 ft. in height, and these, with their interstices, have a capacity of 240,000 bbl. A series of screw-conveyors and bucket-elevators reclaims the cement from storage and feeds it to eight Bates 3-tube baggers in the pack-house. A belt-conveyor carries the sacked cement to a platform for loading into cars or trucks.

An interesting feature in this plant is the use of Farval Dualine fully-automatic centralized lubricating systems on the drives of the three rotary kilns. These were installed late in 1932, when the kiln drives were overhauled for operation with the filters. This type of lubrication was selected because the continuous heavy-duty service requires frequent delivery of the proper kind and amount of lubricants to each bearing.

Each kiln drive has 11 bearings which are supplied with measured quantities of lubricant under pressure at predetermined time intervals. The central pumping unit may be operated automatically at adjustable intervals or may be manually operated at any desired time. The central unit distributes the lubricant to two 4-valve and one 3-valve manifolds from which a discharge line runs to each bearing. The pump is driven by one of the shafts of the kiln drive and lubrication automatically starts and stops with the operation of the drive.

The power-plant, which formerly produced all the power requirements for the two plants and the stone quarry at 2,300 v., consisted of Sterling gas-fired boilers, 6 of 300 hp. and 3 of 400 hp., which supplied steam for the turbine-generators. An Allis-Chalmers 5,000-kw. turbine ordinarily generates enough power for all operations. Two General Electric turbines, of 3,000-kw. and 500-kw. capacities, are kept in reserve. All the large motors in the plant use 2,300-v. current and the smaller motors use 440-v. The 2,300-v. current is transformed into 33,000 v. for transmission to the stone quarry, where it is reduced to the original voltage. The switches and transformers are located in a concrete building which is alongside the feed ends of the kilns and also houses the vacuum pumps.

The new waste-heat boiler installation consists of two Babcock & Wilcox units for the three kilns, each boiler being rated at 42,000 lb. of steam with an exit-gas temperature of 1,300 deg. F. Steam is piped to and hot water from the old power-plant a distance of about 550 ft. through insulated pipes supported on a steel structure. It is expected that the waste-heat boilers will generate sufficient power to operate the entire plant, except possibly when only one kiln is in operation. Auxiliary gas burners on these boilers can be used in this case.

The water for the boilers is cooled by a spray pond which has a capacity of 15,000 gal. per min. Two Worthington 16-in. centrifugal pumps, each driven by a 75-hp. Allis-Chalmers electric motor, circulate the water. Air-compressors, which provide air for slurry agitation and other purposes, are also located in the boiler-room.

The company maintains a complete and well-equipped chemical and physical testing laboratory at the plant. There are also machine, blacksmith and repair shops, storerooms and locker-rooms.

The Oklahoma Portland Cement Co. is a subsidiary of the Ideal Cement Co., Denver, Colo. M. O. Matthews is local manager, Claude Rodarmel is superintendent, and O. A. Bayless is chemist of this plant. The products of this plant include "Lightning" standard Portland and special oil-well cements.

Superior Concrete (from page 36)

With this new arrangement it is possible to load two trucks at one time, with the same or different cements, speeding up the hauling capacity of the trucks considerably. The truck-mixers are first loaded with the desired quantities and sizes of aggregates from the batchers at the silos and are then driven under the cement bins, where water and the desired types of cement are added.

The company owns 11 Jaeger truck-mixers which mix and deliver the concrete. One of these is a 5-cu.yd. unit and the others have 2½-cu.yd. capacities. All are mounted on International motor-truck chassis and have individual Hercules gasoline engines to rotate the mixers. Goodyear tires are used exclusively on these trucks.

Gypsum Production in 1934

The output of crude gypsum and gypsite in the United States in 1934, according to the Bureau of Mines, amounted to 1,491,396 short tons, compared with 1,249,036 tons in 1933, or an increase of 19.4 per cent. Sales of uncalcined gypsum and gypsite (of both domestic and foreign origin) showed a gain of 10.8 per cent., advancing from 455,247 tons in 1933 to 504,325 tons in 1934. Production of calcined gypsum from domestic and imported rock also increased from 912,963 tons in 1933 to 1,024,217 tons in 1934, a gain of 12.2 per cent.

Safety Standards for Aggregates Industries Approved

STANDARDS for health and safety for the aggregates industry, adopted by the Code Authority and approved by the National Recovery Administration, became effective December 27, 1934. Copies of these standards have been mailed to many operators and they are reprinted here for the guidance of others. It is believed that careful adherence to their provisions will prove a dominant factor in reducing the frequency and severity of accidents within the crushed stone, sand and gravel, and slag industries. An additional section is devoted to floating equipment. This will be published in a later issue. The standards follow:

Article 1—General Provisions

Section 1—The purpose of these standards is to provide reasonable safety for life, limb, and health of workers in the Crushed Stone, Sand and Gravel, and Slag Industries, pursuant to the provisions of Sec. 4 of Art. V of the Code of Fair Competition for those industries, approved November 10, 1933. They are intended to serve as a guide for both employer and employee.

Section 2—The provisions contained herein should be liberally construed and applied by the enforcing authority to obtain the best results. Exceptions from the literal requirements may be granted by the enforcing authority in case of practical difficulty or unnecessary hardship, as long as equivalent protection is secured. Where specific devices or methods are mentioned in the requirements contained herein, other devices or methods which would secure equally good results may be used, subject to the approval of the enforcing authority.

Section 3—These requirements shall not supersede any legal requirements which stipulate higher standards.

Section 4—The minimum requirements set forth herein shall apply to all installations made after the date of adoption of these regulations and to all existing installations and conditions which are not in accordance with these requirements, provided, that where adequate safety equipment has been provided, such equipment may remain in use until such time as it should be replaced.

Section 5—In all cases where a specific safety code is cited as minimum requirements, it is understood that such a code is subject to revisions according to subsequent developments and that any changes shall be acted upon by the enforcing authority.

Section 6—In practically all establishments certain specific operations are necessary which are not actual operations belonging to the individual industry. Where this occurs, the allied industry or industries shall observe the Safety and Health Standards of the industry of which they are a part, unless otherwise stated.

Article 2—Definitions

Section 1—"Industries"—The term "industries" as used herein, includes the quarrying, and/or crushing, and/or processing, and/or recovering of stone, sand, gravel, and/or slag for any and all purposes.

Section 2—"Allied Industries"—The term "allied industries" as used herein, includes those industries operated as subdivisions under the Code of Fair Competition for the Crushed Stone, Sand and Gravel, and Slag Industries.

Section 3—"Employee"—The term "employee" as used herein, includes any person engaged in the industries in any capacity receiving compensation for his services, irrespective of the nature or method of such compensation.

Section 4—"Employer"—The term "employer" as used herein, includes anyone by whom any such employee is compensated or employed.

Section 5—"Members of the Industry"—The term "members of the industry" as used herein, includes anyone engaged in the industry as above defined, either as an employer, or on his own behalf.

Section 6—"Enforcing Authority"—The term "enforcing authority" as used herein, includes the Code Authority for the Crushed Stone, Sand and Gravel, and Slag Industries, or any agency designated by the Code Authority to administer safety standards in this code.

Section 7—"Shall"—The word "shall" as used herein, is to be understood as mandatory.

Section 8—"Should"—The word "should," as used herein, is to be understood as advisory.

Section 9—"Prime Movers"—The term "prime movers" as used herein, is to include steam, gas, oil, and air engines, motors, steam and hydraulic turbines.

Section 10—"Operator"—The term "operator" as used herein, includes any person engaged in the operation of machines and mechanical equipment.

Section 11—"Inspector"—The term "inspector" as used herein, includes any person engaged in the industries empowered with the duty of inspecting equipment and appliances.

Section 12—"Quarries and Pits"—The term "quarries and pits" as used herein, shall include open-face quarries and/or pits from which crushed stone, sand and gravel, and slag are taken.

Section 13—"Mines"—The term "mines" as used herein, shall include all subterranean passages from which the materials mentioned in Sec. 12 of these Standards are recovered.

Section 14—"Exposed to Contact"—The term "exposed to contact" as used herein, is to be interpreted as meaning that the location of an object is such that a person is liable to come in contact with it and be injured.

Section 15—"Securely Fastened"—The term "securely fastened" as used herein shall mean that the safety device referred to shall be so secured in place that it cannot be accidentally removed.

Section 16—The term "floating equipment" as used in Art. 1, of Appendix "A" is to include dredges, tow-boats, barges, and floating hoisters, operating under the Code of Fair Competition for the Crushed Stone, Sand and Gravel, and Slag Industries.

Section 17—The Standards for Protection of employees from the hazard of dust set forth in Appendix B of these rules shall apply specifically to operations in the industries where a dust hazard exists as defined in Art. 1 of Appendix B.

Article 3—Electrical Equipment, Wiring and Lighting

Section 1—The effects of good illumination, both natural and artificial, are conducive to the following:

a. Reduction of accidents.
b. Greater accuracy in workmanship.
c. Increased production.
d. Less eye-strain.
e. Greater contentment of the workers.
f. Greater cleanliness.
g. Supervision of employees made easier.

Section 2—Adequate illumination should be applied in all buildings so that employees can perform their duties without the possibility of being injured by falls and other hazards.

Section 3—The use of hand extensions should be avoided except for special purposes.

Section 4—The illumination of yards should penetrate the working area covered in the moving of cars and other equipment by hand. Wherever practicable, the use of flood lights is recommended.

Section 5—All high tension transformer stations shall be provided with an adequate fence which shall be kept locked at all times except for the entry of authorized persons for necessary purposes. "Danger" signs, indicating "high voltage" or the voltage carried, shall be posted conspicuously at such stations and at any other place where there is danger of persons coming in contact with high tension lines. For the purpose of these regulations "high tension" shall mean more than 275 v., ac or dc.

Section 6—All electrical equipment and wiring shall be installed and maintained in a safe manner. Particular attention shall be given to the maintaining of safe clearances where electric wires cross tracks or roads. Such wires should be placed in conduit where necessary.

Section 7—All portable cables for electric shovels, cranes, well drills, or other machinery, shall be well insulated, with such material as will prevent danger to workmen. In any pit, quarry or mine, where wet or damp conditions prevail, such cables shall be of waterproof rubber covered construction, or its equal.

Section 8—In making repairs or splicing or handling bare wires, no employee shall be allowed to undertake this work, unless current is shut off of the part being handled, except it be employee experienced in handling of wires and other equipment, and who is acquainted with the necessary methods of handling and working on electrical current, and they shall be required to use all necessary safeguards to prevent injury to themselves or other employees, such as wearing rubbber gloves, using safety mats, or other protective devices to protect them from danger of electrocution.

Section 9—All electrical equipment, such as motors, generators, controllers, switchboards and switches, shall be equipped with ground wire or other adequate grounding system. This regulation shall apply to all equipment of more than 275 v.

Article 4—Boilers

Section 1—Requirements relating to steam boilers shall be in accordance with the "Boiler Code" of the American Society of Mechanical Engineers.

Article 5—Fire Prevention

Section 1—All buildings should be provided with exits which shall be remote from each other and be so located that no point on a floor is more than 150 ft. from exit.

Section 2—Exit doors shall remain unlocked during working hours. (Doors may be locked against entrance from outside.)

Section 3—Buildings should be provided with some form of fire extinguishment in conformity with the standards of the National Fire Protection Assn.

Section 4—Flammable liquids, having a flash point of less than 100 deg. F., should be stored in separate buildings of incombustible construction, or separated at least 100 ft. from plant buildings.

Section 5—Fire extinguishers shall be kept in operating condition, and protected from freezing. If of the soda-acid or foam type, they shall be inspected at least once a year, and if found necessary, they shall be recharged.

Section 6—Smoking shall be prohibited in stock rooms in which explosives or readily combustible materials are used, handled or stored, and in other places where there is an equal fire hazard.

Article 6—Machine Guarding

Section 1—The application of guards as herein provided covers all moving parts of equipment used in the mechanical transmission of power, including prime movers, intermediate equipment and driven machines exposed to contact.

Section 2—The safeguarding of all connecting rods, cranks, fly-wheels, shafting, pulleys, belts, link-belts, chains, ropes and rope drives, gears, sprockets, friction drives, couplings, clutches, counterweights, revolving or reciprocating parts, bolts, keyways, set-screws, screw conveyors, open elevators, and any other moving equipment exposed to contact shall be required.

Section 3—The type of material used for construction of guards shall be of such a quality that will insure employees adequate protection from being injured.

Section 4—The construction of a guard should be of such a design that would permit it to be removed for repairing equipment. However, care should be taken to make sure that it is securely fastened.

Section 5—All prime movers shall be enclosed by guards or hand rails of a quality sufficient to prevent employees from being injured by becoming exposed to contact with moving parts or electric current. Where there is danger of operators becoming injured by oiling, cleaning and/or repairing prime movers while in operation, such moving parts shall be securely guarded.

Section 6—Machines shall not be operated with guards or shields removed, or when any protective equipment is not functioning properly.

Article 7—Hand Tools

Section 1—Handles of hand tools shall be sound, tight, and free from splinters, sharp edges, and roughness.

Section 2—The use of defective tools, such as mushrooomed chisels, and wrenches with sprung jaws, is prohibited.

Section 3—Hand tools should be inspected at regular intervals by competent persons.

Section 4—Hand tools for the purpose of eliminating hazards at points of operation should be provided when practicable, and in such event the use of such tools shall be mandatory.

Article 8—Hoists, Shovels, Drag Lines and Derricks

Section 1—The engineer or operator of equipment to hoist or lower materials shall be selected with sufficient care to insure competency. No person under 18 years of age shall operate hoisting equipment.

Section 2—Every hoisting engine used for hoisting or lowering materials at any pit, quarry or mine shall be provided with an indicator or signal system from which the engineer can ascertain when the load is approaching the top or bottom of the pit, quarry or mine or any level thereof unless such engineer, look-out, or signal man has a full view of the load at all times.

Section 3—Signal systems used shall be prominently posted in the engine room and all other places from which signals are given. All employees having to do with the operation of the equipment shall be properly instructed as to the operation of the system.

Section 4—The hoisting or lowering of men into pits, quarries, or mines shall conform to the regulations of the U. S. Bureau of Mines.

Section 5—Inclined planes, if used, should be so placed that runaway cars will not run into any working space. Where this is not practicable, suitable derails shall be provided to accomplish this result. Safety blocks or stops should be provided to prevent runaway cars so far as practicable.

Section 6—An efficient brake shall be attached to every drum that is used for hoisting material in any pit, quarry, or mine. All chains and cables shall be inspected at frequent intervals.

Article 9—Oxyacetylene, Oxyhydrogen and Electric Welding

Section 1—Oxyacetylene, oxyhydrogen and/or electric welding, burning and cutting equipment shall be placed under the charge of a reliable and competent person or persons who shall be responsible for keeping it in safe condition. The use of this equipment shall be limited to employees given special training in its safe use.

Section 2—The following precautions should be observed as a minimum in using oxyacetylene or oxyhydrogen equipment:

a. Store cylinders separately in cool places.

b. Handle cylinders carefully.

c. Remove leaky acetylene tanks to the open and keep them well away from fire.

d. Mark all cylinders for gas contained.

e. Stand cylinders on end for discharging well away from sparks or flame.

f. Keep connections and all equipment free from oil or grease. (Oxygen explodes violently on contact with oil or grease.)

g. Use only high grade hose.

h. Inspect and clean hose, fittings and connections at frequent stated intervals.

i. Always blow hose out before making connection between regulator and torch.

j. Wipe couplings and fittings off with a clean cloth before connection; never with dirty or oily waste, rag, or gloves.

k. Fit regulators carefully to cylinders to prevent crossing of threads, looseness of packing nuts, etc.

l. Keep torch always in field of vision.

m. Arrange carefully for fall of sparks to avoid injury to others or danger of fire.

n. In case of back fire, shut off oxygen valve at once, then acetylene. Cool blowpipe and blow carbon out with oxygen before relighting.

o. Follow manufacturer's instructions carefully in lighting. Never light from match in the hand.

p. Shut valves completely before hanging up torch.

Article 10—Use of Explosives

Section 1—Magazines shall be of two types—Class A for the storage of the main supply of explosives, and Class B for the storage at the quarry of the day's supply of explosives.

Section 2—Class A magazines shall be constructed of fire-resistant material, shall be bullet-proof, and shall have no openings other than for ventilation and entrance. Tunnels, if used for this purpose, shall have no other use. Each tunnel shall have only one entrance, and that entrance shall be fitted with a bullet-proof fire-resistant door.

Section 3—Class A magazines located less than 500 ft. from the nearest building or work place must be so located or barricaded that in event of explosion of the contents of such magazine, the force of the explosion shall be so directed as to prevent injury to the employees or buildings.

Section 4—Class B magazines shall consist substantially of a stout box, with hinged lids, preferably bullet-proof and covered with 24-gauge galvanized iron or equivalent flame proofing.

Section 5—All magazines shall be conspicuously marked with markings visible from all practicable directions of approach "Explosives—Dangers."

Section 6—The safest practicable means of transporting explosives to the pit, quarry, or mine, or elsewhere as necessary, shall be carefully determined and the procedure decided upon followed as routine practice. Conveyances shall, as far as practicable, be limited to the transportation of explosives; but where conditions do not justify this, their use in transporting explosives shall be segregated from all other operations and a system of routine inspection adopted to insure the maintenance of such vehicles in a safe condition for the transportation of explosives.

Section 7—Other materials shall not be hauled in the same load with explosives.

Section 8—No person other than the driver, chauffeur, or duly authorized assistants shall be permitted to ride on any vehicle transporting explosives.

Section 9—Nothing in these regulations shall be construed to prohibit a person from walking into a pit, quarry, or mine carrying explosives, provided that the amount carried at any one time by such person does not exceed fifty pounds of dynamite, or two kegs of black powder or 100 blasting caps. Where explosives are thus carried, safe paths or stairs shall be provided in such manner that the danger of falls will be kept at a minimum.

Section 10—All explosives must be transported in the original containers or in a closed container suitable for the purpose.

Section 11—The maximum amount of explosives that may be stored in a Class B magazine shall be 100 pounds. Where blasting operations require amounts too large to meet this limitation, the explosive may be taken direct from the main magazine to the working face for loading.

Section 12—No explosive other than that being used in the process of loading may be left in the quarry except in a Class B magazine.

Section 13—Magazines shall be kept securely locked and keys held only by responsible persons designated by the management.

Section 14—Magazines shall be located in cool, dry places, protected from falling or flying objects.

Section 15—Matches, carbide, oil, gasoline, or articles of iron or steel shall not be kept in the same magazine with explosives.

Section 16—Each employer shall, before allowing any employee to act as blaster or shot firer (including the preparation of charges and the loading of holes), satisfy himself that such employee is fully competent and qualified to perform such operations.

Section 17—Articles containing fire in any form shall be kept a safe distance away from explosives and shall also be so located or protected that sparks can not be conveyed to the explosive.

Section 18—Mallets and wedges of wood, rawhide, fibre, zinc, babbitt metal, or similar non-sparking materials shall be provided for opening containers of explosives. Metals that may produce sparks shall not be used.

Section 19—Tamping sticks shall be of wood and/or soft non-sparking metal, or of wood shod or loaded with such soft metal.

Section 20—When holes are being charged, no person other than those designated to carry on the loading operations shall be permitted to work where he will be in immediate danger in case of a premature explosion.

Section 21—Fuse lengths used in blasting shall be in accordance with the data provided by the fuse manufacturers.

Section 22—Before firing, all left-over explosives shall be returned to the magazines.

Section 23—Adequate alarms shall be given before firing and proper provision shall be made for all in the danger zone to be retired to positions of safety.

Section 24—Each employer shall draw up or cause to be drawn up a standard procedure to govern action in case of misfires. This procedure shall be such as to eliminate hazard as far as possible.

Section 25—Where danger of freezing exists, low freezing or non-freezing explosives shall be used as far as practicable.

Section 26—The thawing of explosives shall be avoided as far as possible, but if done it shall be carried on only in a separate properly isolated place provided for the purpose.

Section 27—Thawing explosives shall not be by other means than indirect steam, hot water, manure, or electric heat. The device or devices used shall be so controlled and located that the explosives can not be exposed to a temperature in excess of 80 deg. F.

Section 28—Safe shelters or refuge places shall be provided in each pit, quarry, or mine, and these shelters shall be of sufficient capacity to accommodate all employees working in the danger zone who are not removed from blasting is being done.

Article 11—Transportation—Railways and Rolling Stock Equipment

(These standards shall apply to railroads not operated by a common carrier.)

Section 1—Automatic couplers should be provided on all new installations as far as practicable.

Section 2—All switching locomotives should be equipped at both ends with platforms, together with hand rails and non-slip steps.

Section 3—All locomotives and automotive equipment shall be equipped with all tools, supplies and signals necessary for proper and safe operation.

Section 4—All locomotive boilers shall conform to the provisions of Sec. 1 of Art. 4 of these Standards.

Section 5—Responsible employees shall be selected for the duty of regularly inspecting all rolling stock and its equipment to insure its maintenance in a safe operating condition.

Section 6—Grade crossing should be eliminated so far as practicable. Where the hazard does not justify this, safeguards suited to the condition shall be provided.

Section 7—Where dead end tracks involve a hazard to life or property, suitable bumping blocks or the equivalent shall be provided.

Section 8—Switches, frogs and guard rails shall be protected so far as practicable with suitable blocks.

Section 9—New switch stand installations other than the upright railroad type shall be so constructed that the lever will be thrown parallel with the rails.

Section 10—A signal imperfectly displayed at any point, or the absence of a signal at a place where a signal is usually shown, shall be regarded as a stop signal, and shall be investigated and reported to the proper authority at once.

Section 11—Where buildings, poles, or other structures are so located relative to the track, as to offer insufficient clearance for a man on the side of a car, there shall be suitable warning signs or telltales so located as to indicate the danger of close clearance.

Section 12—When workmen are loading or unloading in such a manner that a movement of the cars will result in injury, or making repairs to cars on rolling stock equipment where it is necessary for them to go under the equipment, then there shall be a portable derailer or a suitable warning signal to prevent trainmen from making a coupling.

Section 13—For standard gauge tracks the minimum clearances should, wherever practicable, be as follows:

a. From the gauge line of the nearest rail to all stock yards, 5 ft. on tangent track and 5 ft. 6 in. on curved track.

b. From the gauge line of the nearest rail to all other structures not noted above, 6 ft.

c. The minimum overhead clearances should, wherever practicable, be as follows:

From top of rail to any wire or structure, 22 ft.

From top of rail to any high tension transmission line, 35 ft.

d. The minimum distance between nearest gauge lines of adjacent tracks should be 8 ft. 3½ in.

e. Where it is impossible to have an overhead clearance of 22 ft. or more above the top of the rail, suitable "head tappers" shall be erected at proper distances on each side of the structure.

On narrow gauge track safe clearances shall be maintained at all times.

Section 14—No person whose duty shall not require it shall be allowed to ride on a locomotive or train without proper authority.

Article 12—Motor Vehicles

Section 1—Motor vehicles used for transportation on public highways shall conform to the Minimum Standards for Safety and Health in Motor-Vehicle Transportation, approved by the Administrator for that industry.

Section 2—Motor vehicles not operated on public highways shall be maintained in a safe operating condition.

Article 13—Safeguarding Other Working Equipment

Section 1—On any trestle where persons are permitted to walk, there shall be a walkway on at least one side. Its width should be such as to leave a minimum clearance of 3 ft. between the railing of the walkway and the widest rolling stock used. The outer edge of such walkway shall be equipped with a standard railing, except where the walkway is between tracks on a multitrack trestle. Where dumping is done on trestles, all sides of tracks shall be accessible either by means of walkways or working platforms, portable or otherwise.

Section 2—Where men regularly work, or where there is a designated passageway under a trestle not used for dumping purposes, the trestle shall be planked over in such satisfactory manner as to prevent objects falling down from the rolling stock or trestle to the space below.

Section 3—Track hoppers under tracks for the unloading of coal or other material from dumping cars should be covered with a grating so as to catch a man should he fall into a hopper, or, in lieu of such grating, safety belts should be worn by the men when it is necessary for men to go into hopper cars to assist the unloading.

Section 4—Ladders should be regularly inspected for defects. Wherever practicable, non-slip pads or points made of steel should be attached on the floor end of ladders to prevent slipping.

Section 5—Wall openings, floor openings, platforms, runways and other places from which objects or persons might fall shall be equipped with suitable guards, hand rails, and toe-boards.

Article 14—Housekeeping

Section 1—Aisles and passageways should be kept clean and free of materials, containers, and other obstructions. If not otherwise obvious, aisle limits should be plainly marked.

Section 2—Floors and other walkway surfaces should be kept in good repair, and free from accumulations of oil, water, and other materials. Whenever possible, dangerous projections from walkways should be eliminated.

Section 3—Materials should be piled so that they will not easily fall or be displaced by vibration or jolts.

Section 4—In establishments where service rooms, toilets, washrooms, dressing rooms, and lunch rooms are provided, employers shall see to it that they are kept in an orderly and sanitary condition.

Article 15—Protective Clothing and Safety Appliances

Section 1—Life lines and safety belts shall be provided for use on work where falls of persons may occur. Their use is suggested as follows:

a. On ledge cuts.
b. In inspecting quarry face.
c. On steep faces.
d. When working in bins.
e. When working over open crusher.

Section 2—Wherever practicable, employers shall require employees to wear suitable types of goggles for protection against flying objects, metal splashes and other hazards. It is suggested that employers carry goggles in stock so that employees may be fitted with the proper type for various types of work.

Section 3—Employers should require employees to wear safety hats or helmets where there is danger of falling objects. This section refers particularly to mining and pit work.

Section 4—Employers should require employees to wear safety shoes for protection against foot injuries wherever practicable.

Section 5—Where there is danger of employees being injured from engaging in work around molten metal, employers shall furnish goggles and fire-resisting aprons.

Section 6—Employers shall furnish approved gloves to employees on work that requires them to come in contact with electric equipment involving electrical shock hazards.

Section 7—No employee shall be allowed to work with ragged clothing around machinery where there is danger of an accident occurring.

Article 16—Inspection

Section 1—Careful inspection of pit, quarry, or mine by properly trained employees for the purpose shall be made as follows:

a. After shooting.
b. Daily in thawing weather.
c. After heavy rains.

Section 2—Employers shall appoint an inspector or inspectors to make periodical inspections of the entire plant for the purpose of making sure that safety and health provisions of these Standards are being carried out and employees conforming to established rules.

Section 3—No employer shall permit employees to work under an overhanging face or bank in a pit or quarry.

Section 4—No employer shall permit employees to work at the face of a pit or quarry where material slopes at an unsafe angle, except those employees designated to remove such hazard. At such time such employees shall use safety equipment as prescribed in Art. 15, Sec. 1, of these Standards.

Article 17—Instructions to Employees

Section 1—All employees shall be instructed in the hazards incidental to the work engaged in, both in regard to the individual and to fellow workers. Workers who are transferred to unaccustomed tasks should be instructed in the hazards incidental to the new class of work.

Section 2—Workers shall be instructed in the use of, and the necessity of using, the personal protective equipment as outlined in these minimum requirements. Employers shall take steps to require the employees to use such equipment.

Section 3—Employers should furnish employees with a list of mandatory safety rules. All safety rules shall be posted on bulletin boards in each department.

Article 18—Physical Examination

Section 1—If exposed to substances hazardous to health, the worker shall be given physical examination at such intervals as to insure that precautions can be taken to safeguard his health.

Section 2—All workers should be given a physical examination previous to employment and at intervals of not exceeding a year during employment.

Article 19—First-Aid

Section 1—In every establishment, where one or more persons are employed, suitable first-aid equipment shall be provided free of expense to the employees and available for use in case of injury.

Section 2—Employers shall require all employees to apply promptly for first-aid treatment for all injuries sustained at work.

Section 3—In every establishment, depending on the number of persons employed, one or more persons should have a complete course in first-aid, at least equivalent to that prescribed by the United States Bureau of Mines or the American Red Cross, and, so far as it is practicable, an effort should be made to see that all employees are given such a course.

Section 4—In every establishment there should be at least one or more persons trained to the routine of the duties in connection with taking care of, and treating properly, minor accidents.

Article 20—Report of Injuries

Section 1—Every employer shall keep a record of all injuries which cause death or disability or require medical attention other than first-aid treatments, received by his or her employees in the course of their employment, on standard forms approved and furnished by the enforcing authority.

Section 2—Reports of such injuries shall be sent to the Code Authority not later than the fifteenth of each month for all such injuries occurring in the preceding calendar month, on standard forms approved by the Administrator, to be used for analysis of causes and prevention of similar injuries. Reports shall be made available to the Administrator at his request.

Article 21—Safety Committees

Each establishment, depending on its size and the number of persons employed, should appoint a standing safety committee for the purpose of promoting safety work. It is recommended that such committees should meet at least monthly.

MEN OF THE INDUSTRY

FRED B. FRANKS, SR.

FRED B. FRANKS, SR., pioneer cement-plant builder in the Lehigh Valley district, is at present completing a modern new wet-process plant, the first to be built in this country since 1929. This plant, located at Brodhead, Northampton County, Pa., will be operated by the National Portland Cement Co., of which Mr. Franks is vice-president and general manager. Other plants built by Mr. Franks are those of the Martin's Creek Portland Cement Co., at Martin's Creek, Pa., now owned by the Alpha Portland Cement Co., the Bath and Sandt's Eddy, Pa. plants now owned by the Lehigh Portland Cement Co., and the plant of the Keystone Portland Cement Co., at Bath, Pa. Mr. Franks was born in 1879 and, except for a short time in the contracting business, has devoted his entire career to the cement industry.

Personal Mention

L. T. Sunderland, president of the Ash Grove Lime & Portland Cement Co., Kansas City, Mo., recently made a gift of $5,000 to the student loan fund at the University of Nebraska.

George H. Boucher has been elected a vice president of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

A. L. Lehr has been elected president of the Pioneer Sand Co., St. Joseph, Mo., to succeed the late Capt. R. J. Stewart. **C. J. Feeney,** secretary of the company, was made general manager.

P. B. Reinhold, secretary and treasurer, Reinhold & Co., Inc., Pittsburgh, Pa., was elected vice president of the Northeastern District of the American Road Builders' Assn., at the recent annual meeting of that body held in Washington, D. C.

Ray P. Tarbell has been appointed manager of the welding division of the Ideal Electric & Mfg. Co., Mansfield, O.

A. J. Meyer, at the recent annual meeting of the Carthage Marble Corp., Carthage, Mo., resigned as president and director, positions which he had held for the past 5 years. His place has not yet been filled.

J. L. Powell, president of the Powell Lime & Cement Co., Memphis, Tenn., has been elected vice president of the Superior Building & Loan Assn. of that city.

Virgil N. Connar, formerly manager of the Pittsburgh office of the Universal Atlas Cement Co., has been promoted to the office of technical manager with headquarters in New York City.

Generoso Pope, head of the Colonial Sand & Gravel Co., Long Island City, N. Y., was honored at a banquet given Feb. 5 by the Gridiron Club of Flushing.

William R. Blair, sales manager for the Southwestern Portland Cement Co. at El Paso, Tex., has been named a director of this company to succeed the late W. E. Keller. Mr. Blair is also president of the El Paso Chamber of Commerce.

E. F. Cirkal has been appointed superintendent for the U. S. Gypsum Co., at the plant of the Dittlinger Lime Co., New Braunfels, Tex., which it recently took over.

J. E. Begert, general manager of the rock wool plant of the Johns-Manville Corp. at Alexandria, Ind., has been transferred to the main office of the company in New York City where he will have direct charge of processes and new products in all of the company's plants. **K. W. Huffine,** formerly factory superintendent, succeeds Mr. Begert as general manager at the Alexandria plant.

Malcolm McIntyre, formerly with the Consolidated Rock Products Co., Los Angeles, Cal., has joined the Basalt Rock Co., Napa, Cal., and is now in charge of sales of rock and gravel.

Harry F. Van Wagner has been promoted from the position of sales manager of the New Jersey district to the position of manager of the Boston, Mass., district of the Universal Atlas Cement Co.

Alton Jones, who for over 7 years has been connected with the Banner Rock Corp., and its successor, the Johns-Manville Corp., at Alexandria, Ind., has resigned to accept the position of plant manager for the Eagle-Picher Lead Co. at Joplin, Mo.

F. G. Terwilliger, service man for the Fuller Co., Catasauqua, Pa., and formerly working out of that office, is now located at the Chicago, Ill., office of the company and will service installations in that territory.

M. J. McHugh, Jr. has been elected secretary and treasurer of the Consolidated Feldspar Corp., and Golding Sons Co., Trenton, N. J.

Lorenzo Zambranos, president of Cementos Mexicanos, S. A., Monterrey, Mexico, is recuperating in a California sanitarium from injuries received in an automobile accident several months ago.

Obituary

J. J. Jorgenson, for many years proprietor of the Jorgenson quarry at Menasha, Wis., died recently in Racine, Wis. He retired from active business many years ago and sold his property at that time to the Quarry Products Co.

C. P. Steventon, 40, purchasing agent of the International Cement Corp., New York, N. Y., died Feb. 12.

Charles H. Boynton, 66, died Feb. 11 at his home in New York City. Mr. Boynton had a distinguished and varied career in newspaper and financial work and in 1921 was made assistant to the president of the Atlas Portland Cement Co. which position he held until his retirement in 1930 because of poor health.

W. A. Hansen, 39, president of the Colfax Stone Co., Colfax, Wis., died recently at a hospital in Eau Claire, Wis., following an operation for ruptured appendix.

John A. Lowery, president of the Northwest Magnesite Co., Chewelah, Wash., died recently.

Joseph Julian, 64, general mill and production foreman of the Lehigh Portland Cement Co. plant at Oglesby, Ill., for the past 36 years, died suddenly Feb. 11 from a heart attack while at work at the plant.

Henry Hanlein, 64, head of the limestone contracting firm of Henry Hanlein & Son, New York City, died Feb. 26 after a brief illness.

Edwin A. Grein, 32, a quarry driller at the plant of the Ste. Genevieve Lime & Quarry Co., Ste. Genevieve, Mo., was instantly killed Feb. 11 by a falling rock while at work in the quarry.

▼ *Coming Events* ▲

March 4-8, 1935, Philadelphia, Pa.—Spring group meeting of standing committees, American Society for Testing Materials.

March 5-7, 1935, New York, N. Y.—Sixth Annual Greater New York Safety Conference, Pennsylvania Hotel, New York City.

March 5-8, 1935, Wichita, Kan.—Eighth Annual Southwest Road Show and School.

April 15-16, 1935, Philadelphia, Pa.—Second Annual Greater Philadelphia Safety Conference.

April 23-25, 1935, Columbus, O.—All-Ohio Safety Congress, Neil House, Columbus.

May 6-7, 1935, Boston, Mass.—New England Safety Conference, Statler Hotel, Boston.

May 16, 1935, Watertown, Wis.—Eighth Annual Rock River Valley Safety Conference.

June 24-28, 1935, Detroit, Mich.—Annual convention, American Society for Testing Materials, Book-Cadillac Hotel.

NEW CORPORATIONS

THE AMBERG GRANITE CO., Amberg, Wis. Incorporators, Drew Daniels, Lyle D. Daniels and Elmer Gummer.

THE PALMER STONE WORKS, INC., Albemarle, N. C. Capital $25,000. Incorporators, M. Palmer and J. H. Palmer.

MISHKIN SAND CO., Brooklyn, N. Y. Incorporator, Harry Mishkin.

AMERICAN GRADED SAND CO., Chicago, Ill. Capital 100 shares A stock. Incorporators, Henry J. Wenske, Herbert Wenske and Edward Piper.

AMULCO ASPHALTS, INC., 5432 W. 67th St., Chicago, Ill. Capital 2,500 shares n.p.v. Incorporators, Sterne S. Gibney, Lucia N. Gibney and Nettie Gibney. To manufacture, buy, sell, deal in and with paving materials and commodities and any and all kindred and allied products. Correspondent, Nat M. Kahn, 1757 First National Bank Bldg., 33 S. Clark St., Chicago, Ill.

GENERAL MATERIAL CO. OF ILLINOIS, Dover, Del. Capital 2,000 shares n.p.v. To deal in lime, cement, plaster and concrete.

EDWARD F. MCKENNA, INC., Jersey City, N. J. Capital $100,000. Agent, Jack G. Goldberg, Jersey City, N. J.

THE S. CHARLES QUARRY CO. Incorporators, Henry J. Bangert, Ferguson, Mo.; Charles Campbell, Clayton, Mo.

THE GOLDSBORO SAND CO., Goldsboro, N. C. Capital $100,000. Incorporators, Robert E. Bryan, James R. Bryan and others.

THE DUNAVANT QUARRIES, INC., Charlotte, N. C. Capital $25,000. Incorporators, S. J. Dunavant, L. W. Dunavant and others.

The Simplicity Engineering Co., Durand, Mich., has appointed the H. M. Davison Co., with offices at 194 Frelinghuysen Ave., Newark, N. J., and 30 Church St., New York, N. Y., as resale agent for the state of Connecticut; the southeastern portion of New York state; and the northern half of New Jersey and Metropolitan New York City.

Latest Portland-Cement Statistics

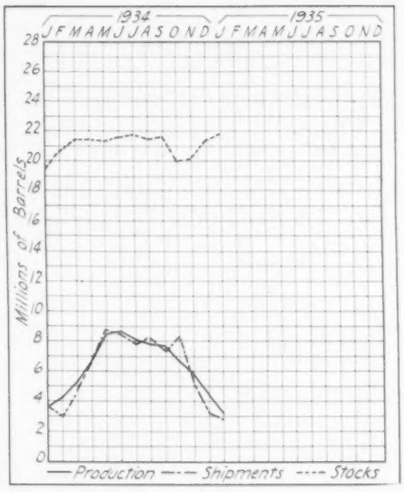


Chart showing monthly production, shipments and stocks on hand at end of month from January, 1934, to January, 1935.

THE Portland cement industry in January, 1935, produced 3,202,000 bbl., shipped 2,846,000 bbl. from the mills, and had in stock at the end of the month 21,816,000 bbl. Production and shipments of Portland cement in January, 1935, showed decreases of 15.3 and 24.7 per cent., respectively, as compared with January, 1934. Portland cement stocks at mills were 11.6 per cent. higher than a year ago. The factory value of the shipments from the mills in 1934—75,917,000 bbl.—is estimated as $115,771,000.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 162 plants at the close of January, 1935, and of 163 plants at the close of January, 1934.

RATIO (*per cent.*) OF PRODUCTION TO CAPACITY

	January		Dec.	Nov.	Oct.
	1934	1935	1934	1934	1934
The month..	16.6	14.1	19.5	26.2	29.3
The 12 months ended	23.9	28.8	29.0	28.7	28.3

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1934 AND 1935 (*In thousands of barrels*)

Month	Production		Shipments		Stocks At End of Month	
	1934	1935	1934	1935	1934	1935
January	3,779	3,202	3,778	2,846	19,547	21,816
February	4,168	.....	2,952	.....	20,762	.....
March	5,257	.....	4,618	.....	21,422	.....
April	6,544	.....	6,492	.....	21,557	.....
May	8,554	.....	8,784	.....	21,301	.....
June	8,813	.....	8,541	.....	21,600	.....
July	8,144	.....	7,898	.....	21,852	.....
August	7,842	.....	8,249	.....	21,424	.....
September	7,680	.....	7,388	.....	21,734	.....
October	6,675	.....	8,439	.....	19,972	.....
November	5,779	.....	5,674	.....	20,078	.....
December	4,447	.....	3,104	.....	*a* 21,460	.....
Totals	77,682	.....	75,917	.....	.....	.....

a Revised.

DISTRIBUTION OF CEMENT[1]

Shipped to—	December		January		Shipped to—	December		January	
	1933	1934	1934	1935		1933	1934	1934	1935
Alabama	100,482	76,703	120,597	85,084	New Mexico	16,139	20,656	17,361	26,954
Alaska	0	0	396	132	New York	232,319	310,852	227,196	200,557
Arizona	20,199	15,965	26,984	7,732	North Carolina	45,077	30,994	59,997	40,442
Arkansas	58,402	52,6599	42,826	44,215	North Dakota	3,978	3,129	7,384	2,500
California	373,141	339,721	420,939	339,386	Ohio	140,350	119,446	131,995	110,874
Colorado	24,420	24,234	26,540	31,312	Oklahoma	100,657	70,971	101,643	80,070
Connecticut	25,078	31,618	24,328	16,359	Oregon	19,686	49,967	28,175	46,266
Delaware	13,800	10,040	8,147	7,425	Pennsylvania	162,376	173,159	208,317	140,209
Dist. of Col.	36,781	47,067	44,541	35,783	Puerto Rico	11,605	15,331	7,700	10,225
Florida	63,941	58,371	85,609	59,973	Rhode Island	9,852	10,966	10,183	5,551
Georgia	50,585	33,520	76,961	44,636	South Carolina	17,848	23,153	26,218	26,273
Hawaii	11,989	19,938	12,756	30,129	South Dakota	9,320	6,202	5,932	4,823
Idaho	7,355	6,706	8,096	5,028	Tennessee	82,777	120,388	98,058	142,481
Illinois	309,726	158,940	133,420	133,855	Texas	217,494	173,229	244,007	233,622
Indiana	94,689	38,360	68,130	42,793	Utah	7,313	6,705	7,739	10,146
Iowa	40,874	30,933	36,582	27,054	Vermont	3,461	3,421	3,741	2,096
Kansas	69,184	45,163	84,581	60,540	Virginia	68,082	46,336	103,602	53,143
Kentucky	73,566	42,499	55,883	35,012	Washington	36,412	41,296	66,403	28,998
Louisiana	96,860	40,856	99,525	48,233	West Virginia	42,747	47,136	55,535	28,038
Maine	6,692	6,971	6,711	2,781	Wisconsin	64,003	28,743	64,953	25,411
Maryland	64,611	58,301	51,441	48,618	Wyoming	6,348	9,551	5,673	3,809
Massachusetts	70,212	77,054	69,993	39,098	Unspecified	1,115	3,165	1,187	8,364
Michigan	120,573	65,426	171,041	55,021		3,653,348	3,045,195	3,707,827	2,814,082
Minnesota	36,845	25,061	28,533	18,886	Foreign countries	84,652	58,805	70,173	31,918
Mississippi	49,759	29,029	50,277	35,029					
Missouri	157,835	70,636	95,930	71,721					
Montana	10,743	34,499	11,586	27,077					
Nebraska	22,509	19,590	27,642	13,186					
Nevada	227,041	173,335	244,948	146,814	Total shipped from cement plants	3,738,000	3,104,000	3,778,000	2,846,000
New Hampshire	7,448	10,051	4,907	5,964					
New Jersey	109,049	87,153	84,978	64,354					

[1] Includes estimated distribution of shipments from 1 plant in December, 1934; from 2 plants in November, 1933 and 1934 and in December, 1933.

Link-Belt Co. Appoints Mexican Representative

The Link-Belt Co., Chicago, Ill., announces the appointment of General Supply Co., S. A., Calle Balderas No. 56-58, Mexico, D. F., as their stock-carrying distributor of conveying and power-transmitting machinery in the Federal District and the state of Mexico. This company is headed by Albert Isaac, pres., and K. O. Nellen, manager.

Federal Motor Truck Co. Has Silver Anniversary

The Federal Motor Truck Co. of Detroit, Mich., has just celebrated its Silver Anniversary. On this occasion, Federal executives, employees and dealers paid tribute to Martin L. Pulcher, president of the company, who enjoys the unique distinction of being the directing head of a motor truck company for a quarter of a century. Mr. Pulcher's experience in the automotive industry dates back 29 years when he was one of the incorporators and secretary-treasurer of the Oakland Motor Car Co.

The Federal Motor Truck Co. was incorporated under the laws of the State of Michigan on February 14, 1910.

Some idea of the growth of the company can be gained by a comparison of the small original plant containing about 5,000 square feet of floor space with the modern truck factory occupied by Federal today which covers eight and one-half acres and comprises more than 500,000 square feet of floor space.

Manhattan Patents a New Low-Tension Rubber Belt

The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., announces that patents have been granted the company for their Condor Compensated Belt, a low-tension rubber belt. In this belt the construction is such that ply stresses are equalized when the belt flexes around a pulley.

Ohio Power Shovel Co. and Lima Locomotive in Merger

The Ohio Power Shovel Co., wholly owned subsidiary of the Lima Locomotive Works, Inc., has been consolidated with the parent company. All business in the future which involves Lima shovels, draglines and cranes will be handled directly by the Lima Locomotive Works, Inc., Shovel and Crane Division.

There will be no change in the personnel of the organization, and the Shovel and Crane Division offices will remain in the Lima Trust Bldg., Lima, O.

Ohio Forge Appoints New Chicago Territory Agent

The Ohio Forge and Machine Corp., Cleveland, O., successors to Gears & Forgings, Inc., manufacturers of gears, speed reducers, forgings and special machinery, announce the appointment of The Denton and Anderson Co., 1225 West Washington Blvd., Chicago, Ill., as its representatives in the Chicago territory. Associated with Geo. E. King in this office are Clyde G. Bassler, C. A. Gould and John R. Poyser.

Bucyrus-Erie Co. Appoints New Tennessee Distributor

Bucyrus-Erie Co., South Milwaukee, Wis., announce the appointment of John Bouchard and Sons Co., 11th Ave. North and Harrison St., Nashville, Tenn., as Loadmaster distributor for the Central portion of the state of Tennessee.

Lime Shipments

THE shipments of lime in November, 1934, totaled 118,887 tons, which was below the October record but above that of September (Table I). The decline, compared with October, was 11.9 per cent. However, the November totals for chemical, agricultural and building lime (other than finishing hydrate) were higher than a year previous.

Of the total November shipments, chemical lime accounted for 90,992 tons, or 76.5 per cent., building lime 23,920 tons, or 20.1 per cent., and agricultural lime 3,975 tons, or 3.4 per cent. All types of lime showed decreases compared with October—47.6 per cent. in the case of agricultural lime, 14.7 per cent. in building lime, and only 5.0 per cent. in chemical lime. Despite this slight decline, chemical-lime shipments maintained a remarkable steadiness throughout 1934.

Prices continued to improve (Table II). The price of agricultural lime, which was $8.01 in September and $8.77 in October, rose a cent to $8.78 in November. That of chemical lime, $6.73 in October, rose to $6.78 in November. The price of building lime, however, fell from $10.85 in September to $10.75 in October, and to $10.65 in November.

Quicklime shipped in bulk sold at $5.78 for agricultural purposes, at $8.47 for building, and at $6.08 for chemical—the average price of all bulk quicklime being $6.19. These prices compare with $5.11, $8.26, $6.09 and $6.18 in October.

The prices of quicklime shipped in barrels ranged from $16.89 for agricultural ($17.60 in October), to $16.50 for building ($17.14 in October) and to $15.66 for chemical ($16.71 in October), the average being $16.36 ($17.08 in October).

Quicklime in bags sold at $8.84 for agricultural ($9.06 in October), at $12.51 for building ($12.10 in October), and at $9.64 for chemical ($8.78 in October), the average being $10.64 ($10.41 in October).

Hydrate sold at $8.77 for agricultural ($8.94 in October), at $9.13 for building ($9.07 in October), and at $8.19 for chemical ($8.04 in October), the average being $8.59 ($8.54 in October).

The ratio of total shipments to pro-

(Continued on page 48)

Table I.—SHIPMENTS OF LIME IN 1934, BY KINDS AND USES (*tons*)

Month	Kinds[1]	Uses			Totals
		Agriculture	Building	Chemical	
April	Quicklime	5,945	12,531	75,187	93,663
	Hydrate	26,990	14,476[2]	20,722	62,188
	Totals	32,935	27,007	95,909	155,851
May	Quicklime	5,184	11,569	86,807	103,560
	Hydrate	26,392	14,560[2]	22,503	63,455
	Totals	31,576	26,129	109,310	167,015
June	Quicklime	1,555	11,314	71,170	84,039
	Hydrate	12,444	14,694[2]	23,359	50,497
	Totals	13,999	26,008	94,529	134,536
July	Quicklime	855	10,422	63,713	74,990
	Hydrate	7,296	13,804[2]	20,895	41,995
	Totals	8,151	24,226	84,608	116,985
August	Quicklime	4,683	12,151	63,809	80,643
	Hydrate	14,111	14,267[2]	19,729	48,107
	Totals	18,794	26,418	83,538	128,750
September	Quicklime	3,126	10,052	61,156	74,334
	Hydrate	10,304	11,470[2]	20,811	42,585
	Totals	13,430	21,522	81,967	116,919
October	Quicklime	1,840	12,748	73,767	88,355
	Hydrate	6,654	15,291[2]	22,028	43,973
	Totals	8,494	28,039	95,795	132,328
November	Quicklime	1,212	10,001	71,387	82,600
	Hydrate	2,763	13,919	19,605	36,287
	Totals	3,975	23,920	90,992	118,887

[1] Do not include the following miscellaneous lime: April, 3,136 tons; May, 3,595 tons; June, 2,915 tons; July, 2,275 tons; August, 4,075 tons; September, 3,699 tons; October, 3,339 tons; November, 674 tons.
[2] Does not include finishing lime.

Table II.—SHIPMENTS OF LIME IN NOVEMBER, 1934, BY KINDS AND USES[1]

Kinds	Agriculture		Building[2]		Chemical		Total	
	Tons	Per Ton	Tons	Per Ton	Tons	Per Ton	Tons	Per Ton
Quicklime:								
In bulk	147	$5.78	3,098	$8.47	66,568	$6.08	69,813	$6.19
In barrels	47	16.89	3,793	16.50	804	15.66	4,644	16.36
In bags	1,018	8.84	3,110	12.51	4,015	9.64	8,143	10.64
Hydrate	2,763	8.77	13,919	9.13	19,605	8.19	36,287	8.59
Totals or averages	3,975	$8.78	23,920	$10.65	90,992	$6.78	118,887	$7.62

[1] Do not include 3,339 tons of miscellaneous lime. [2] Does not include finishing lime.

Table III.—SHIPMENTS AND VALUE OF LIME AND RATIO OF SHIPMENTS TO CAPACITY IN 1933 AND 1934, BY MONTHS

Month	Total Capacity of Concerns Reporting[1] (*tons*)	Shipments Reported (*tons*)	Average Value Per Ton	Ratio of Shipments to Capacity (*per cent.*)												
				United States	Districts											
					1	2	3	4	5B	6-8-9	7	10-11	12	13	14	15
1933																
December	390,553	107,860	$6.72	27.6	17.7	16.3	40.0	21.1	27.9	15.2	41.1	33.8	25.9	22.9	20.3	19.6
1934																
January	392,636	112,437	7.31	28.6	12.2	19.4	39.6	26.3	33.0	23.8	38.1	43.0	36.1	23.4	17.4	17.1
February	406,215	111,506	7.17	27.4	9.7	19.3	35.7	25.5	38.4	18.3	35.9	37.2	42.9	25.5	26.2	18.4
March	392,806	143,699	7.50	36.5	15.5	35.1	47.8	40.4	31.7	25.3	48.2	40.3	49.4	24.7	52.4	26.5
April	391,860	158,987	7.66	40.5	24.4	55.4	53.0	50.7	38.9	29.2	43.7	39.1	44.9	26.5	24.8	20.4
May	397,365	170,610	7.68	42.9	26.9	53.6	62.8	49.4	37.3	28.7	49.8	46.7	36.8	28.7	25.1	23.0
June	396,174	137,451	7.88	34.6	23.8	32.1	49.0	46.3	30.4	25.5	45.4	32.7	34.1	30.4	31.3	18.6
July	409,330	119,259	7.79	29.1	21.1	25.8	34.8	39.8	25.3	24.1	42.1	30.4	32.3	23.4	22.7	19.4
August	404,429	132,825	7.82	32.8	19.0	41.6	39.5	40.7	30.1	28.6	43.1	32.5	32.0	25.4	24.2	21.1
September	401,039	120,618	7.67	30.0	18.2	30.6	36.6	34.6	26.9	23.3	43.1	29.8	24.3	21.5	14.8	19.9
October	407,803	135,667	7.71	33.3	21.0	32.4	36.4	50.7	26.7	26.7	45.3	37.4	24.9	20.7	27.8	24.1
November	404,887	119,561	7.61	29.5	16.4	25.7	32.0	41.8	28.3	23.1	42.5	37.4	22.2	18.0	23.0	21.1

[1] Idle capacity reported as follows: December, 12,679 tons; January, 12,687 tons; February, 14,150 tons; March, 7,313 tons; April, 3,564 tons; May, 6,397 tons; June, 7,152 tons; July, 14,937 tons; August, 8,699 tons; September, 8,140 tons; October, 8,790 tons; November, 11,016 tons.

Labor Conditions

THE seasonal downward trend in employment, begun in July in the quarrying, nonmetallic-mining and cement industries, continued into January of this year, according to information gathered by the U. S. Department of Labor.

Quarrying Industry.—In January 1,056 quarries reported the employment of 23,958 workers, a decline of 12.2 per cent. in the employment index from the December figure of 27,286 workers. The December index, 42.1, was itself 15.1 per cent. below the November figure of 49.5 (Table I).

One-week pay-rolls fell from $508,596 for 1,126 plants in November to $389,418 in December and to $344,577 in January for 1,056 plants. The pay-roll indexes corresponding to these figures were 29.4, 23.6 and 20.8. The November-to-December loss was 23.6 and the December-to-January loss 20.8 per cent. In January the index stood 5.0 per cent. higher than in January, 1934 (Table I), representing the highest annual gain since September.

Per-capita weekly earnings dropped to $14.30 in December, the latest month for which figures are available. This was 5.7 per cent. below the November level (15.43), but 41.1 per cent. above the December, 1934, figure ($14.18).

The average number of hours worked per week (Table I) was 29.6 in December, a 6.9 per cent. decline from November and 2.3 per cent. from the previous December.

Average hourly earnings were 47.9 c. in December, a 0.6-per cent. rise from November and a 6.2-per cent. increase for the year. It was exceeded in 1934 only by the figures for June (48.0 c.), July (48.6 c.) and October (48.2 c.).

Comparisons of employment and pay-rolls in 1,153 quarries in November and December, 1934, are given in Table II. Increases in employment occurred in five states—Colorado 10.0 per cent.; Florida 0.6 per cent.; Mississippi 14.0 per cent.; Montana 10.7 per cent.; and Oklahoma 0.7 per cent. The decreases which occurred in the 43 other states ranged from 57.3 per cent. in Texas to 0.9 per cent. in Virginia. Fourteen states showed decreases exceeding 20 per cent., including Maine 51.1 per cent., Nebraska 47.1, Connecticut 42.2, Wisconsin 37.6, Michigan 34.4, Minnesota 33.9, Illinois 33.8, Maryland 32.9, South Dakota 31.2, etc.

Pay-roll increases appeared in six states and ranged from 1.4 per cent. in Oregon to 100.0 per cent. in Colorado. In Mississippi where employment rose 14.0 per cent., pay-rolls increased only 3.8 per cent. In New Hampshire employment declined 19.8 per cent., but pay-rolls increased 5.2 per cent., and in Oregon, where employment dropped 4.5 per cent., pay-rolls rose 1.4 per cent.

In the month ended December 15, 1934, there were no increases or reductions in wage rates, thus repeating the record of the preceding month (Table III).

Cement Industry.—One hundred and forty cement plants employed 17,989 workers in November, 15,223 in December and only 13,604 in January, the corresponding employment indexes being 48.2, 41.6 and 37.2. These represent declines of 4.9, 13.7 and 10.6 per

Table I.—EMPLOYMENT, PAY-ROLLS AND EARNINGS IN THE QUARRYING AND NONMETALLIC-MINING INDUSTRIES, IN 1933 AND 1934, BY MONTHS

(Gains are shown in bold-faced type, losses in light-faced type)

Month	Establishments Reporting	Employment				Pay-Rolls				Per-Capita Weekly Earnings			Average Hours Worked per Week			Average Hourly Earnings		
		Employees on Pay-Rolls	Index of Employment[1]	Percentage Change From—		Amount of Pay-Rolls (1 week)	Index of Pay-Rolls[1]	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—	
				Preceding Month	Year Ago			Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago
December 1934	1,162	30,658	45.3	11.3	**7.1**	$434,751	24.4	13.7	**10.4**	$14.18	2.7	**3.3**	31.3	3.7	.....	46.1c.	**.9**	.....
January	1,144	26,217	39.7	12.5	**13.1**	368,224	21.3	12.6	**17.7**	14.05	.1	**4.1**	30.8	1.9	.....	45.6c.	**.2**	.....
February	1,192	26,561	38.8	2.2	**11.5**	374,577	21.0	1.5	**20.7**	14.10	.7	**8.2**	31.1	**1.3**	.....	45.4c.	(3)	.....
March	1,180	28,610	42.0	**8.3**	**19.7**	434,572	24.1	**14.8**	**35.4**	15.19	**5.9**	**13.2**	33.5	**6.3**	2.7	45.6c.	**.7**	**17.7**
April	1,186	32,629	48.7	**15.9**	**23.9**	522,154	29.9	**23.9**	**48.0**	16.00	**6.9**	**19.5**	34.2	**4.0**	4.3	46.9c.	**2.6**	**27.1**
May	1,148	36,111	54.3	**11.4**	**25.1**	615,248	35.0	**17.3**	**47.1**	17.04	**5.3**	**17.7**	36.0	**4.0**	8.0	47.5c.	**.8**	**30.1**
June	1,149	38,250	56.6	**4.4**	**19.7**	648,890	37.0	**5.5**	**34.5**	16.96	**1.1**	**12.6**	35.8	**1.4**	11.9	48.0c.	**.8**	**30.1**
July	1,087	34,830	55.6	1.9	**12.3**	568,501	35.0	5.4	**23.2**	16.32	3.6	**9.6**	34.0	5.0	17.0	48.6c.	**1.3**	**32.4**
August	1,122	36,151	54.7	1.5	**6.0**	580,114	34.0	2.8	**13.7**	16.05	1.4	**7.4**	33.7	.6	11.3	47.9c.	**1.4**	**15.7**
September	1,140	35,569	53.3	2.6	**1.3**	556,778	32.4	4.8	**10.6**	15.65	2.3	**9.2**	33.0	2.9	3.0	47.8c.	.2	**10.2**
October	1,118	34,149	51.8	2.9	**2.6**	542,831	32.1	.8	**2.9**	15.90	**2.3**	**5.8**	33.4	**3.1**	1.5	48.2c.	**.2**	**9.0**
November	1,126	32,959	49.5	4.3	3.1	508,596	29.4	8.3	**3.9**	15.43	4.2	**7.2**	32.3	4.2	**1.0**	47.8c.	.6	**6.4**
December 1935	1,056	27,286	42.1	15.1	7.1	389,418	23.6	20.0	3.3	14.30	5.7	**4.1**	29.6	6.9	2.3	47.9c.	**.6**	**6.2**
January	1,056	23,958	36.9	12.2	7.1	344,577	20.8	11.5	**5.0**	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Before March 1, 1934, the index numbers were based on 1926 = 100; since then they have been based on the 3-yr. average, 1923 to 1925, as 100.
[3] No change.

Table III.—CHANGES IN WAGE RATES IN THE QUARRYING AND NONMETALLIC-MINING INDUSTRIES, IN 1933 AND 1934, BY MONTHS

Month Ended	Establishments Reporting	Employees	No Change		Increases		Decreases	
			Establishments	Employees	Establishments	Employees	Establishments	Employees
Nov. 15	1,185	34,303	1,178	34,132	7	171	.....	.....
Dec. 15	1,162	30,658	1,149	30,431	12	214	1	13
Jan. 15	1,144	26,251	1,138	26,149	6	68	.....	.....
Feb. 15	1,192	26,561	1,189	26,536	3	25	.....	.....
Mar. 15	1,180	28,610	1,179	28,550	1	60	.....	.....
Apr. 15	1,186	32,629	1,166	31,007	20	1,622	.....	.....
May 15	1,148	36,111	1,123	33,616	25	2,495	.....	.....
June 15	1,149	38,250	1,139	37,838	10	412	.....	.....
July 15	1,087	34,830	1,078	34,786	9	44	.....	.....
Aug. 15	1,122	36,151	1,121	36,071	1	80	.....	.....
Sep. 15	1,140	35,569	1,138	35,537	2	32	.....	.....
Oct. 15	1,118	34,149	1,116	33,995	2	154	.....	.....
Nov. 15	1,126	32,959	1,126	32,959	.....	.....	.....	.....
Dec. 15	1,156	29,252	1,156	29,252	.....	.....	.....	.....

Table V.—CHANGES IN WAGE RATES IN THE CEMENT INDUSTRY, IN 1933 AND 1934, BY MONTHS

Month Ended	Establishments Reporting	Number of Employees	No Change		Increases		Decreases	
			Establishments	Employees	Establishments	Employees	Establishments	Employees
Nov. 15	113	10,071	113	10,071	.....	.....	.....	.....
Dec. 15	129	10,851	129	10,851	.....	.....	.....	.....
Jan. 15	121	9,495	121	9,495	.....	.....	.....	.....
Feb. 15	125	12,745	125	12,745	.....	.....	.....	.....
Mar. 15	120	13,023	120	13,023	.....	.....	.....	.....
Apr. 15	119	12,414	96	7,694	23	4,720	.....	.....
May 15	122	17,593	115	16,372	7	1,221	.....	.....
June 15	131	19,495	119	17,259	12	2,200	.....	.....
July 15	129	19,158	127	19,026	2	132	.....	.....
Aug. 15	123	16,920	122	16,814	1	106	.....	.....
Sep. 15	122	16,799	121	16,763	1	36	.....	.....
Oct. 15	116	15,849	116	15,849	.....	.....	.....	.....
Nov. 15	140	19,881	543	19,691	1	190	.....	.....
Dec. 15	131	15,241	131	15,241	.....	.....	.....	.....

cent., when compared with the preceding month in each case, but gains of 17.0, 13.7 and 4.5 per cent. when compared with the same month of the preceding year (Table IV).

One-week pay-rolls (Table IV) fell from $329,468 in November to $267,940 in December and to $235,762 in January. The indexes were 29.4, 24.1 and 21.2 respectively. Although the month-to-month losses were continuous (9.1 per cent. from October to November, 18.1 from November to December, and 12.0 from December to January), each month showed a large gain over the same month of 1933—27.8 per cent. in November, 26.2 in December, and 9.3 in January.

Per-capita weekly earnings, which were $18.31 in November, fell to $17.07 in December, a loss of 5.1 for the month but a gain or 11.1 per cent. for the year. The average hours worked per week were 30.3 in December, a decline of 5.0 per cent. from the 32.4 of November but a 13.8 per cent. gain for the year. Average hourly earnings fell only 0.2 per cent. to 56.3 c. in December from November's 57.6 c., but showed a gain of 3.0 per cent. for the year.

A single case of wage-rate increase occurred in the month ended November 15 and affected 190 workers. There were no changes in the following month (Table V).

Table II.—COMPARISON OF EMPLOYMENT AND PAY-ROLLS IN IDENTICAL QUARRY AND NONMETALLIC-MINING ESTABLISHMENTS, IN NOVEMBER AND DECEMBER, 1934, BY STATES

(Gains are shown in bold-faced type, losses in light-faced type)

State	Number of Establishments	Number on Pay-Roll, December, 1934	Percentage Change from November, 1934	Amount of Pay-Roll (1 week) December, 1934	Percentage Change from November, 1934
Alabama	15	424	2.3	$5,013	5.8
Arizona	3	33	15.4	361	33.1
Arkansas	4	91	9.0	869	21.4
California	38	952	3.2	16,035	11.7
Colorado	5	40	**100.0**	578	**100.0**
Connecticut	23	203	42.2	3,329	21.8
Delaware					
Dist. of Columbia					
Florida	17	1,035	.6	12,809	**2.0**
Georgia	26	1,526	**3.8**	15,754	6.5
Idaho					
Illinois	24	514	33.8	8,723	33.8
Indiana	94	1,260	15.3	19,098	17.4
Iowa	26	345	17.3	5,064	31.2
Kansas	29	1,100	11.6	22,817	5.9
Kentucky	42	1,162	9.5	11,112	17.2
Louisiana	7	642	8.9	7,863	13.5
Maine	11	257	51.1	3,418	66.1
Maryland	8	147	32.9	1,801	48.1
Massachusetts	18	355	14.5	6,904	19.9
Michigan	48	1,028	34.4	17,850	33.5
Minnesota	26	205	33.9	3,194	40.1
Mississippi	10	147	**14.0**	1,296	**3.8**
Missouri	59	1,249	20.1	16,110	28.7
Montana	8	83	**10.7**	1,250	8.3
Nebraska	10	231	47.1	1,759	67.4
Nevada					
New Hampshire	8	203	19.8	6,027	**5.2**
New Jersey	34	545	12.0	10,385	8.9
New Mexico					
New York	79	2,017	12.0	35,612	20.6
North Carolina	11	225	27.7	2,210	40.0
North Dakota					
Ohio	130	3,427	15.3	47,887	23.3
Oklahoma	13	139	**.7**	1,608	**1.5**
Oregon	5	63	4.5	1,029	**1.4**
Pennsylvania	156	4,258	18.4	57,678	21.8
Rhode Island					
South Carolina	5	141	23.0	1,493	29.0
South Dakota	6	44	31.2	602	45.0
Tennessee	22	710	6.4	8,260	16.9
Texas	12	137	57.3	2,588	45.5
Utah	7	93	13.1	1,670	22.3
Vermont	38	1,690	6.9	28,231	7.6
Virginia	31	1,192	.9	12,639	7.6
Washington	13	205	2.8	2,850	3.1
West Virginia	20	787	10.1	9,681	13.1
Wisconsin	12	111	37.6	1,515	40.7
Wyoming					
Totals	1,153	29,016		$415,172	

Lime (from page 46)

duction capacity was 29.5 per cent., compared with 33.3 per cent. in October and 30.0 per cent. in September. District 7 (Illinois, Indiana and Missouri) led with a ratio of 42.5 per cent., while District 4 (Virginia, North Carolina and South Carolina) came second with 41.8 per cent.

Cleveland Company Holds New Equipment Exposition

The W. T. Walsh Equipment Co., 3088 W. 106th St., Cleveland, O., on March 7 to 9, 1935 held an exhibition of new 1935 construction and industrial equipment at its new large warehouse and office at that location. Demonstrations, exhibitions, movies, and refreshments served to instruct and entertain visitors.

Following is a list of exhibitors at this show:

American Floor Surfacing Co., Anthony Co., Austin Machinery Corp., Barco Mfg. Co., The Bonnot Co., Brookville Locomotive Co., William Bros. Boiler & Mfg. Co., Butler Bin Co., Cleveland Rock Drill Co., Continental Roll & Mfg. Co., D-A Lubricant Co., Euclid Road Machine Corp., Fulton Bag & Cotton Mills, The Foote Co., Gunitor Co., Frank G. Hough Co., Huber Mfg. Co., Hughes-Keenan Co., International Harvester Co., Ladel Conveyor Co., McKiernan Terry Corp., Michigan Power Shovel Co., National Carbide Sales Corp., Novo Engine Co., Rosco Mfg. Co., Schramm, Inc., Shanklin Mfg. Co., Sterling Wheelbarrow Co., Timken Roller Bearing Co., Wellman Engineering Co., White Mfg. Co.

Table IV.—EMPLOYMENT, PAY-ROLLS AND EARNINGS IN THE CEMENT INDUSTRY, IN 1933 AND 1934, BY MONTHS

(Gains are shown in bold-faced type, losses in light-faced type)

Month	Establishments Reporting	Employment				Pay-Rolls				Per-Capita Weekly Earnings			Average Hours Worked per Week			Average Hourly Earnings		
		Employees on Pay-Rolls	Index of Employment[1]	Percentage Change From—		Amount of Pay-Rolls (1 week)	Index of Pay-Rolls[1]	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—		Average for Month	Percentage Change From—	
				Preceding Month	Year Ago			Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago		Preceding Month	Year Ago
December 1934	129	10,851	33.6	11.3	**2.1**	$172,067	17.6	17.1	**2.3**	$15.86	6.6	**.2**	28.5	10.9	.....	54.2c.	**2.6**	.....
January	121	9,495	32.6	2.8	**8.7**	164,507	17.9	**1.7**	**19.3**	17.33	**4.6**	**9.3**	31.4	**7.9**	.....	55.7c.	1.1	.....
February	125	12,745	37.6	**15.2**	**26.6**	212,111	20.8	**16.2**	**39.6**	16.64	**.8**	**10.2**	30.8	**4.1**	.....	53.1c.	1.7	.....
March	120	13,023	42.4	**3.4**	**30.1**	224,218	24.1	**7.0**	**46.1**	17.22	**3.5**	**11.7**	31.9	**4.6**	10.6	53.6c.	**.2**	**29.9**
April	119	12,414	48.0	**13.3**	**24.0**	245,774	30.6	**27.0**	**65.4**	19.80	**12.1**	**33.3**	35.3	**7.6**	**3.6**	55.5c.	**3.7**	**33.3**
May	122	17,593	57.6	**20.0**	**42.2**	332,867	35.8	**17.1**	**68.1**	18.92	2.4	**18.3**	33.2	3.5	13.0	56.8c.	**2.2**	**39.0**
June	131	19,459	59.1	**2.6**	**27.1**	395,590	39.9	**11.4**	**57.7**	20.33	**8.5**	**23.9**	35.6	**8.9**	8.0	56.4c.	.9	**39.1**
July	129	19,158	58.4	1.2	**16.3**	387,041	39.1	1.9	**40.6**	20.20	.8	**20.7**	34.7	2.3	8.7	57.1c.	**.7**	**35.4**
August	123	16,920	55.0	5.8	**3.6**	323,831	35.4	9.6	**10.6**	19.14	.4	**6.6**	33.0	5.2	5.9	57.8c.	**1.0**	**20.3**
September	122	16,799	54.0	1.8	**12.5**	320,082	33.9	4.2	**31.4**	19.05	2.5	**16.2**	32.9	1.2	**6.3**	57.2c.	**.8**	**13.1**
October	116	15,849	51.0	5.5	**15.9**	300,874	33.1	2.3	**34.0**	18.98	.3	**3.3**	33.0	**1.9**	**3.5**	57.6c.	**.7**	**6.9**
November	140	17,989	48.2	4.9	**17.0**	329,468	29.4	9.1	**27.8**	18.31	4.4	**9.4**	32.4	3.3	**6.6**	56.6c.	1.0	**6.0**
December 1935	140	15,223	41.6	13.7	**13.7**	267,940	24.1	18.1	**26.2**	17.07	5.1	**11.1**	30.3	5.0	**13.8**	56.3c.	.2	**3.0**
January	140	13,604	37.2	10.6	**4.5**	235,762	21.2	12.0	**9.3**	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Before March 1, 1934, the index numbers are based on 1926 = 100; since then they have been based on the 3-yr. average, 1923 to 1925, as 100.

Foreign Developments

Suggests Cements with "Fluxes" High in Calcium

Investigations by Dr. K. Koyanagi of Tokyo, which he reports in *Zement* for October 25 (23:633-635), lead him to conclusions which not only confirm the accepted view that alite consists of tricalcium silicate, but also that alumina and iron oxide can be replaced in Portland cement by other minerals, perhaps even in commercial operation, with effects beneficial to cement quality. Iron and alumina are necessary essentially as fluxes, which made possible the formation of the tricalcium silicate at a considerably lower temperature than would otherwise be possible. In Koyanagi's experiments he found that by substituting calcium-bearing fluxes, such as fluorspar and gypsum, for the iron oxide and alumina it was possible to produce a cement consisting almost completely of alite and possessing unusually high strength characteristics. The initial setting time was slower than in the case of ordinary Portland (4 hr. 18 min.) but the final set is normal (5 hr. 33 min.). Tensile strength (1:3 mortar) in kg. per sq.cm. was 40 at 3 days, 45 at 7 days, 49 at 28 days, 55 at 45 days, 58 at 90 days, and 59 at 180 days; compressive-strength results at the same periods were, respectively, 666.5, 730, 825, 887, 926 and 986 kg. per sq.cm. Koyanagi's investigations are still in progress and he does not venture a conclusion whether the production of such a cement would be economically possible, but suggests at least the possibility of improving the quality of Portland by further investigations along this line.

Quality of Cement and Resistance to Corrosion

A long and extensive series of tests on the influence of different cements on the resistance of concrete to chemical action of corrosive waters is reported by Otto Graf and Kurt Walz in *Zement* for July 5, 12, August 2, 9 and 16 (23: 376-389, 401-411, 448-453, 461-466 and 473-475). Contrary to the practice in many investigations on this subject, the specimens were not completely immersed in the solutions employed, but were only partially immersed so as more closely to approximate the conditions of concrete subjected to such corrosive action in practice. The cements employed were brands selected from those on the market. Of the cements used, four were Portlands, three blast-furnace, two fused alumina and two mixed cements of 1 part each of Portland and trass cements. The aggregate used throughout was a sand and gravel from the Rhine. The liquids used were Stuttgart hydrant water with 0.9 per cent. sodium sulphate; the same water with 2.1 per cent. sodium sulphate; the same water with 2.4 per cent. magnesium sulphate; artificial sea water (Stuttgart hydrant water and 2.73 per cent. NaCl +0.34 per cent. $MgCl_2$+0.24 per cent. $MgSO_4$+0.13 per cent. $CaSO_4$); Stuttgart water with 5 per cent. sodium chloride; mineral water from Stuttgart Mountain; distilled water, and plain Stuttgart water. The specimens were made up in the form of prisms 50 cm. long, and after hardening for 14 days were stood up in baths of the respective solutions, only the lower 18 cm. being submerged in the liquid. In order to observe the effect of water in motion, the solutions in some of the vessels were agitated morning and night by blowing a little compressed air through the vessels. At the end of the desired periods of test, the results were studied in various ways: by studying the change in the chemical composition of the solution, the alterations in weight, the changes in appearance, bending and compressive strength, and salt content of the concrete specimens after standing.

The results and conclusions of the tests, presented in numerous tables, are rather beyond the scope of such a brief notice; particularly interesting, however, are the observations made on the basis of both the externally apparent changes and the strength tests, in which, under the test conditions, the most apparent differences in the behavior of specimens was not between Portland and fused alumina cements, but rather between various brands of either class of cement. It is also worthy of special note that in the tests with sodium sulphate, magnesium sulphate and in the sea water and ordinary salt solutions, under the conditions of these tests, the alumina cements stood up not so well as either the Portland or the blast-furnace cements.

Adopt Standard Method for Stone Impact Test

In August of this year the German Association for Testing Materials (Deutscher Verband für die Materialprüfung der Technik) issued a standard specification, DVM 2109, for the testing of crushed stone for resistance to impact and pressure.

Each test uses a quantity of 2.1 liters consisting of equal parts of 30- to 40-, 40- to 50- and 50- to 60-mm. stone. The sample is put in a mortar 17 cm. in diameter and 15 cm. high, and covered by a lid 16.8 cm. in diameter moving inside the mortar in the manner of a piston. The impact test employs a Föppl apparatus in which a 50-kg. cast-iron hammer, guided between standards, is dropped on the cover over the stone from a height of 50 cm. After 20 blows the stone is screened through a 0.2-mm. square mesh and four round-hole screens with openings 1-, 3-, 10- and 30-mm. diameter. The degree of crushing is calculated by subtracting the fineness coefficient (computed by adding the percentages of residue on the various screens and dividing by 100) after the test from that before the test.

In the test for resistance to pressure the same quantity and gradation of stone is used, and it is put in the same mortar and covered with the same lid. The test is made by means of an appropriate press exerting a pressure of 40 tons. The maximum pressure is attained in 1 to 1½ min. and is immediately released. The results of the test are then ascertained and computed as in the impact test.

Councillor Stübel of the State Railway, Kassel, where many investigations on tests of this sort have been carried on and from whom some of the data employed in preparing the standard were obtained, discusses the standard in the November 1, 1934, *Steinindustrie* (29:313-314). Investigations of the State Railway show that in tests of this sort it is essential, if uniform and significant results are to be obtained, that the sample in each test be of the same gradation; that the sample be measured in parts by volume rather than by weight and that in evaluating the results the proportion of all sizes in the fines resulting from the tests be taken into account in computing a coëfficient.

The apparatus employed by the State Railway differs in certain respects (electrically-driven apparatus; quantity of sample and number of blows; hammer falling directly on the sample instead of a cover), so that the numerical results do not compare exactly, but the same essential principles are applied.

Jigging Kiln Suggested for Burning of Cement

A new type of kiln for the burning of cement clinker is suggested by Dr. Kyriacou of Paris in a brief article in *Zement* for November 22, 1934 (23:-694-696). It employs the same principle essentially as the Lepol kiln: the hot gases are drawn downward through a shallow layer of the raw material, accomplishing a rapid exchange of heat; in this machine the portion corresponding to the sintering zone has a solid bottom, while in the portion corresponding to the pre-

heating sections the hearth is built for the suction of gases down through the material. The whole hearth is supported in a jigging mechanism and the material moves forward through the kiln by successive impulses of the jigging mechanism, as in the jigging conveyor and similar mechanisms. By regulating the speed of the motor and thus the frequency of the impulses, the rate at which the material travels through the kiln can be controlled to a fine degree. No experimental data are given; the writer says, however, that machines of this type have been employed in potash works, and that the kiln can be constructed for any thermal operation, such as drying, calcining and sintering.

Calcining and Mortar Strength of Dolomite

An investigation on the influence of the manner of calcining of dolomite on the strength of mortars made with the resulting binder is reported by Dr. Ing. Ludwig Holleck in *Tonindustrie-Zeitung* 58:1093-1095, Nov. 8, 1934. The raw material was crushed to "nut" size, screened free from powder and burned in an electric muffle kiln with automatic temperature regulation. The lime so burned was made into 1:3 mortar specimens and tested at various intervals of time. The results are summed up in the table:

Specimen	% CO_2	Temperature ° C	cm^3 H_2O	Compressive strengths kg/cm^2 7 days	28 days	56 days
				1—2	(Tamped)	
D_0	46.1	unburned	30			
D_1	29.2	850	70	38	70	79
D_2	25.0	800	75	57	95	112
D_3	22.0	900	88	99	148	162
D_4	20.1	850	80	107	160	171
D_5	18.1	950	105	60	116	134
D_6	16.6	950	125	45	91	120
D_7	2.4	1100	200	13	48	68

A similar investigation on the calcining of lime was carried out, the principal observations concerning which were that in the case of white lime the variations in strength were considerably less than in the case of dolomite lime, and that after 7 days the strengths of the two almost coincided.

Aluminum Chloride Waste as Puzzolanic Admixture

Aluminum chloride is produced by treating kaolin, previously heated at 800 degrees C., with a mixture of chloride and carbon monoxide. In the production of this material, there is a residue of about 60 tons of by-product from every 100 tons of kaolin treated, the residue containing 88 to 96 per cent. silica, 12 to 4 per cent. alumina and traces of iron and lime; the free silica, shown by the soda process, being 12.5 per cent. The presence of free silica makes this residual material a good puzzolanic admixture for cement, and tests reported by Dr. P. P. Budnikov of Kharkov in *Zement* (23:749-750, December 20, 1934), show, among other things, that the cement mortar's resistance to the attack of mineral solutions is considerably increased by a 30 per cent. admixture of the material. Furthermore, addition of 60 to 70 per cent. of the residue with cement produces a cement with a pleasing white color, which stands up well under tests for soundness and the like, and is suggested as a substitute for commercial white cement for finish work and the like. In a tensile strength test such a mixture with 70 per cent. of the residue showed 18.4 kg./sq.cm. at 28 days in 1:3 mortar, as against 26.8 kg. for standard Portland in the check test.

Makes Suggestions for Loss-on-Ignition Tests

The determination of loss on ignition should always be executed with cement in its natural condition without preliminary drying. The test should be carried on in such a way that within 10 to 15 minutes a temperature of between 900 and 1,000 degrees C. is reached. This temperature is then held until the specimen reaches a constant weight. Portland cements can be ignited in air, but alumina cements and blast-furnace cements, because of their content of substances susceptible to oxydation, must be ignited in a nitrogen current; in these cases a separate determination of the water and carbon dioxide contents is to be preferred. The tolerated limit of 3 per cent. loss on ignition, as is prescribed in Italian standards, seems too low; it would be desirable to raise this to 4 per cent.—V. Sevieri and M. Marconi in *Le Industrie del Cemento*, 1934, No. 10; *Tonindustrie-Zeitung* 59:12, January 1, 1935.

Denies Cement Set Is Solely a Colloid Action

Dr.-Ing. K. Koyanagi of Tokyo reports in *Zement* for November 29, 1934 (23:705-708) a series of experimental observations (principally microscopic) on the set and hardening of Portland cement, showing that in the setting of Portland no very coarse crystals are formed but that during the hardening the formation of numerous crystals of calcium hydrate takes place, and, according to him, the more abundant the formation of the crystals the higher is the capacity of the cement to harden. In opposition to most all investigators except Tippman (*Zement* 1930 No. 52, 1931 No. 11 and No. 34), Koyanagi ascribes to the calcium hydrate crystals a very important role in the hardening of cement, and declares that the statement that the hardening of Portland cement is a purely colloid-chemical phenomenon is not correct.

Methods of Silica Test For Finding Cement Mix

In the determination of the cement content of a hardened mortar or concrete the essential thing is to determine the content of soluble silica, which is proportionate to the amount of cement, assuming that the aggregates contained no appreciable amounts of soluble silica. Because of conflicting methods and conclusions concerning the determination of this soluble silica, Dr. A. Steopoe of Bukharest conducted experiments, reported in *Zement* (23:758-762, December 27, 1934), which make him conclude that it is not sufficient to treat the powdered concrete or mortar with acid alone, but rather with both acid and alkali to reveal the whole soluble silica. To avoid as far as possible any solution of sand, it is possible to use cold normal hydrochloric acid and likewise cold 5 per cent. sodium carbonate solution, which dissolve all the silica of the cement. To yield a clear filtrate, both reagents are displaced with 5 per cent. sodium chloride and 0.8 per cent. hydrochloric acid used as a wash. The investigator recommends that in the testing of unknown mortar the determination of acid-soluble and alkali-soluble silica be separately carried out in order to see whether the mortar contains hydraulic admixtures. The procedure of the test is stated in detail.

Brinell Test Found Not Applicable to Concrete

Investigations concerning the debated question whether the strength of articles bound with concrete can be determined by means of the Brinell test show that this method is not applicable to this purpose. The diameter of the impression of the Brinell sphere is a constant function of the compressive strength of the pure cement or cement mortar. Certain relationships can be determined, but the results vary considerably according to the provenance of the cement and the nature of the test specimen. Above a certain strength limit any relationship whatever between the diameter of the Brinell impression and strength disappears; rather, above this limit the diameter of the impression remains always the same. —L. Santarelli in *Le Strade*, July, 1934; *Tonindustrie-Zeitung* 59:12, January 1, 1935.

Recent Patents

Cement

Manufacture of Portland cement. Martin Newcomer, Woodbridge, N. J., and Vincent K. Newcomer, Independence, Mo. No. 1,959,796.

Method of heating cement raw material. David J. Uhle and Max E. Grunewald, Coplay, Pa. No. 1,961,311.

Process of producing a uniformly colored cement. Anthony L. Asher and Walter G. Meyer, Milwaukee, Wis. No. 1,963,540.

Production of hydraulic cement. Carl Pontoppidan, Holte, Denmark, assignor to F. L. Smidth & Co., New York, N. Y. No. 1,966,419.

Concrete

Tandem mixer batchmeter and timing-gear control. Erich H. Lichtenberg, Milwaukee, Wis., assignor to Koehring Co. No. 1,962,960.

Concrete-mixer. James E. Bushnell, North Plainfield, N. J., assignor to Ransome Concrete Machinery Co. No. 1,963,952.

Concrete-mixer. James E. Bushnell, assignor to Ransome Concrete Machinery Co. No. 1,963,953.

Water-tank for concrete-mixers. Lion Gardiner, Columbus, Ohio, assignor to Jaeger Machine Co. No. 1,966,291.

Crushing and Grinding

Hammer mill. Elias G. Myers, Toledo, Ohio, assignor to Myers-Sherman Co., Chicago, Ill. No. 1,960,346.

Portable mill. Lawrence F. Yender, Carroll, Iowa. No. 1,960,836.

Crusher. Harvey H. Rumpel, Milwaukee, Wis., assignor to Smith Engineering Works. No. 1,960,980.

Grinding-mill. Harry P. Guollo, New York, N. Y. No. 1,961,291.

Crusher. George D. Becker, West Allis, Wis., assignor to Allis-Chalmers Mfg. Co. No. 1,961,811.

Grinding-machine. Louis C. Park, Toronto, Ont., Canada. No. 1,961,862.

Rock-crushing machine. Herbert W. Pudan, Los Angeles, Calif. No. 1,962,462.

Hammer mill. Frank N. G. Kranick, Racine, Wis., assignor to J. I. Case Co. No. 1,962,778.

Grinding-mill with air-sealing device. Ralph M. Hardgrove, Bethlehem, Pa., assignor to Fuller Lehigh Co. No. 1,965,186.

Grinding-mill and process of operating it. Ralph M. Hardgrove, Bethlehem, Pa., assignor to Fuller Lehigh Co. No. 1,965,643.

Excavating and Loading

Power shovel. Henry W. Kakaska, South Milwaukee, Wis. No. 1,960,626.

Power shovel. Trevor Davidson, Milwaukee, Wis., assignor to Bucyrus-Erie, Co. No. 1,961,199.

Bucket elevator. Gerald H. Hutton, London, England. No. 1,962,075.

Training idler for conveyor belts. Samuel D. Robins, Bewlett, N. Y., assignor to Robins Conveying Belt Co., Passaic, N. J. No. 1,963,099.

Conveyor attachment for tunnel shovels. Johnston P. Potter, St. Catherines, Ont., Canada. No. 1,965,000.

Mining apparatus. Charles F. Osgood, Claremont, N. H., assignor to Sullivan Machinery Co. No. 1,966,131.

Loading-machine. Charles F. Osgood, Claremont, N. H., assignor to Sullivan Machinery Co. No. 1,966,459.

Power shovel. William M. Huston, Lima, Ohio, assignor to Ohio Power Shovel Co., same place. No. 1,966,759.

Gypsum

Process of calcining gypsum. Lewis C. Karrick and William L. Ellerbeck, Salt Lake City, Utah. No. 1,967,029.

Lime

Production of hydrated lime. Leonard G. Sewell and Flaxney P. Stowell, Buxton, England, assignors to Imperial Chemical Industries Ltd. No. 1,960,756.

Mining

Mine-car. Otto Sann, Johnstown, Pa. No. 1,959,599.

Mine cars. Audley H. Snow, Mayberry, W. Va., assignor to Sanford Investment Co., Wilmington, Del. Nos. 1,961,016, 1,961,017, 1,961,018, 1,961,019, 1,961,020, and 1,961,021.

Screening and Classifying

Process and means for sizing partite material. Richard Peale, St. Benedict, and Kenneth Davis, Ebensburg, Pa., assignors to Peale-Davis Co. No. 1,961,449.

Material-screening apparatus. Robert S. Walker, Cleveland, Ohio, assignor to Link-Belt Co. No. 1,961,467.

Gyratory sifter. Walter L. Keefer, Chambersburg, Pa. No. 1,961,669.

Mechanism for separating intermixed divided materials. Hobart N. Durham, Jackson Heights, N. Y. No. 1,961,743.

Screen separator. Percy P. Bowen, North Tonawanda, N. Y. No. 1,961,921.

Material classifier and distributor. Henry G. Lykken, Minneapolis, Minn. No. 1,962,450.

Washing

Apparatus for scrubbing and treating gravel. William H. Allswede, Hersey, Mich. No. 1,965,568.

Sand-washer. Andrew F. Howe, University City, Mo. No. 1,967,028.

Sand handling and conditioning apparatus. Max W. Goldberg and Wallace W. Drissen, Port Washington, Wis., assignors to Modern Equipment Co., same place. No. 1,966,116.

FOREIGN

Cement

Hydraulic cement. C. Pontoppidan. French 752,671.

Process and apparatus for production of iron or iron compounds and Portland cement in a rotary kiln. L. P. Basset. French 753,622.

Wet-process cement manufacture. Arno Andreas, Munster, Westphalia. German 576,109.

Waterproofing cement, etc. I. G. Farbenindustrie A.-G., Frankfurt. German 579,386.

Thickening cement slurry. Fried. Krupp Grusonwerk A.-G., Magdeburg-Buckau. German 577,521.

Improvement of cement, mortar and concrete. Chemische Fabrik Grünau Landshoff & Meyer A.-G., Grünau, Berlin. German 578,716.

Simultaneous production of iron or its compounds and Portland cement. Lucien Paul Basset, Paris. German 578,204.

Accelerating the hardening of cement. P. Mecke. French 754,113.

Apparatus for dehydrating cement slurry. J. J. Durien and F. L. Dubois. French 754,218.

Manufacture of cement. Soc. An. des Ciments Francais et des Portland de Boulogne-sur-Mer and Compagnie des Portland de Devres. French 754,296.

Process and apparatus for making white cement. Soc. des Ciments Francais et des Portland de Boulogne-sur-Mer and Compagnie des Portland de Devres. French 754,728 and 754,775.

Cement and mortar for hydraulic uses. H. J. Billings. French 754,730.

Coolers

Traveling-grate cooler with rotary kiln. Arno Andreas, Munster, Westphalia. German 565,400.

Kilns

Process for feeding shaft kilns. Ernst Cetto, Saal. German 565,469.

Feeding rotary kiln. G. Ceoymans. British 391,028.

Device for rotary kiln. N. Vogel-Jorgensen. French 754,020.

Rotary cement kiln. F. L. Smidth & Co. A.-S., Copenhagen. German 575,997.

Cement kiln feeder. Heinrich Honemeier, Steinhausen. German 576,111.

Pulverized-coal burner for rotary kilns. Arno Andreas, Munster, Westphalia. German 576,425.

Burning cement in rotary kilns. Grudex Corp., Allentown, Pa. German 576,688.

Apparatus for preliminary burning or sintering. Lepol Internationale Patent verwertungs G.m.b.H., Berlin. German 578,-935, addition to 466,298.

Burning lime, cement, dolomite etc. in the shaft kiln. Josef Rohm, Cologne. German 579,881.

Rotary-kiln feeder. Fried. Krupp Grusonwerk A.-G., Magdeburg-Buckau. German 577,416.

Burning cement in the shaft kiln. Arno Andreas. German 577,616.

Rotary kiln with coolers surrounding the trommel. Vickers-Armstrongs Ltd., Westminster, London. German 579,615.

Device for introducing cool gas into rotary kilns. Fried. Krupp Grusonwerk A.-G., Magdeburg-Buckau. German 581,711.

Drive for grates in shaft kilns. Robert Friedrich, Brunswick. German 582,038.

Rotary kiln. Johan Sigismund Fusting Copenhagen. German 580,572.

Device for passing gases through a layer of material. Fried. Krupp Grusonwerk A.-G., Magdeburg-Buckau. German 580,573.

Closure for shaft kilns. Fried. Krupp Grusonwerk A.-G. German 580,692.

Lime and Magnesia

Etablissements Poliet et Chausson. French

Manufacture of hydraulic limes. Soc. An.

Production of lime construction material. Charles Holmes Harrison and Arthur Hugo Harrison, Hamilton, Ont. German 578,389.

Production of pure white construction units from lime and fillers. Karl F. Höller and Stephan Schless, Salzburg. German 583,253.

Mining and Quarrying

Stripping process. Lübecker Maschinenbau Gesellschaft, Lübeck. German 567,892.

Stripping apparatus. Maschinenfabrik Buckau. R. Wolf A.-G., Magdeburg. German 576,926.

Sacking

Bag-filling machines. H. S. Johns. British 390,005.

Device for handling sacks at bagging machines. Arno Andreas, Munster, Westphalia. German 574,154.

Measuring device. Arno Andreas. German 577,311.

Screening and Separating

Separation of solids from liquid by means of vibrating screens. H. Meyer. French 753,155.

Air separator. Eugene Camille Saint-Jacques, Paris. German 578,206.

Magnetic separator. Fried. Krupp Grusonwerk A.-G., Magdeburg-Buckau. German 580,274.

Washing

Washing granular materials. D. MacLean, Brakpan, Transvaal. British 396,233.

Washing granular materials. R. Pourbaix, Harmignies, Belgium. British 396,-359.

Washing granular materials. Dorr Co., Inc., New York. British 398,579.

Unclassified

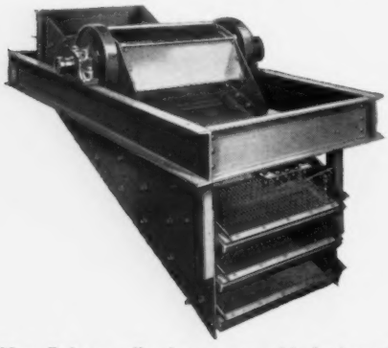
Producing porous, dry slag with water. Ludwig v. Reiche and Julius Giersbach, Oberscheid, Dilkreis. German 583,555 and 583,633.

Producing porous slag. Paul Ohrt, Dusseldorf. German 582,500.

New Machinery and Supplies

Horizontal Frame Used on Telsmith Pulsator Screen

The Smith Engineering Works, Milwaukee, Wis., has developed a new heavy-duty Pulsator vibrating screen designed to screen sand, gravel, crushed rock, ore or coal, wet or dry. The eccentric action of the pulsator produces a circular movement which, it is said, produces a maximum screening action, uniform at all points on every deck and under any load. The frame which carries the entire weight of the vibrating unit and dependent screen decks is made of heavy channels in the smaller sizes of screens and of I-beams in the large sizes. The frame is horizontal and can be supported from below on special



New Pulsator vibrating screen with horizontal base.

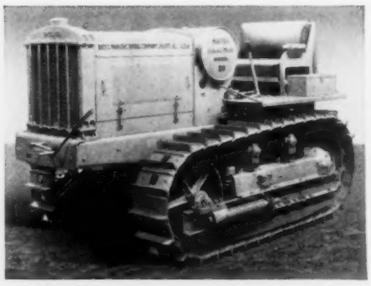
rubber pads or by springs from cables.

The vibrating unit actuating the screen decks is mounted on the frame and may be readily removed and taken apart in the field. The shaft from which the decks are suspended turns in self-aligning outboard bearings and the decks are suspended from a bearing unit consisting of two eccentric bearing housings welded to a large steel pipe. The cylindrical roller bearings in these shells are protected by both labyrinth and piston ring seals. Balance is provided by means of two flywheels carrying removable counterweights. The supporting springs are located in two nests, at upper and lower ends of the screen trays, both nests on the central longitudinal axis of the apparatus. These springs carry practically all the load of both decks and aggregate, thereby relieving the load on the end bearings. The new Telsmith Pulsator is made in 8 sizes from 2-ft. by 6-ft. to 4-ft. by 12-ft., in single, double, or triple decks.

Bates Model 35 Tractor Has Many New Features

The Bates Manufacturing Co., Joliet, Ill., builders of the Bates Steel Mule, announce a new Model 35. This new tractor is said to incorporate all the advantages of the old Bates 35 and many new features of interest.

Improved design provides greater riding comfort, greater steering ease, smoother operation and longer life. The rear end engine vibration which so often results from the play in wearing clutch parts is eliminated. This has been accomplished by a unique design for the main engine clutch and transmission. The weight of the clutch parts is supported midway of two bearings providing a sturdy support. The transmission gear shaft extending from the clutch is supported on two bearings, one of which is the same bearing as is used on the clutch shaft. A gear type coupling is incorporated between the clutch shaft and transmission shaft so that the necessary flexibility is obtained between the two members and each bearing



Bates improved Model 35 tractor.

has its proportionate loading. The result is the clutch is held in proper clutch rotating balance.

In the crawlers, the crawler housing supporting the track idlers has been extended to give greater protection to the drive sprocket. The wide track rail has been retained and uniform heat treating of track shoes is assured. Greater clearance has been introduced between the truck wheel flanges and track rails, assuring longer wear before flange replacement is necessary.

The deep leather upholstered seat has been moved back to provide more leg room. In its new location, the operator sits directly over the rear axle, thus riding on a gently pivoting point. The braking pressure of the steering brakes has been increased and the crawler can be stopped with a relatively light pressure of the foot. The standard Bates brake lock is mounted on the left-hand brake pedal.

The drag links between the steering clutch operating levers and the bell cranks on the clutches are adjustable at both ends. This permits maintaining the hand-steering lever and bell cranks in a constantly relative position regardless of the wear of the steering clutch faces, and in addition, takes up the wear of both ends of the drag link. The new Bates Model 35 tractor has a drawbar pull of slightly over 43 hp. and can be powered for either Diesel, oil, or gasoline.

Rubber-Tired Trail Cars Have Dump Car Features

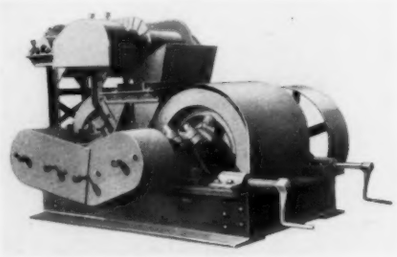
A line of trail cars (in 8 to 25-ton sizes) for handling coal, ore, rock, dirt or other materials of heavy weight and bulk has been announced by the Austin-Western Road Machinery Co., Aurora, Ill. Engineered for maximum pay-load operation, these cars (on rubber tires) have features similar to those employed by recognized builders of railroad dump cars. Equipped with bottom or side dump doors that operate by air, hydraulic or mechanical (manual) controls, these trail cars come in three standard body designs, including special, built-to-order constructions.

According to the manufacturers, these trail cars will haul more than double the load that a truck tractor can carry on its own chassis. Features include a full universal, gravity-cushioned fifth wheel for rough surface travel without strain or distortion; generous ground clearance for easy dumping; low overall height for quick, convenient loading; dumping controlled by truck driver from cab; short turning radius with ample clearance; massive, semi-elliptic springs, mounted directly under center sills; automatic safety dumping devices, etc.

Austin-Western rubber-tired trail car.

Make Geared-Link Roll Crusher in Two Sizes

The F. M. Welch Engineering Service, Inc., Greenville, O., is manufacturing a line of Greenville roll crushers designed to crush graded aggregates including the smaller sizes of pebbles and crushed stone.



Geared-link double-roll crusher with apron feeder.

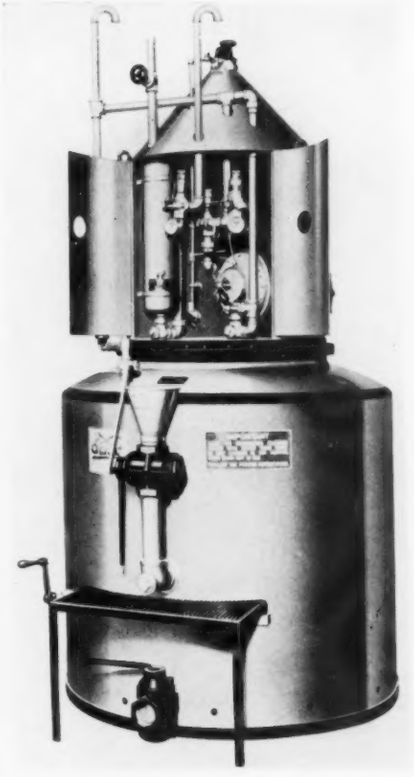
The 28 by 20-in. crusher is furnished complete on a base with an apron feeder and geared driving link. The rolls consist of special heat-treated steel face shells mounted on cast-steel adjustable cones. Adjusting screws permit setting the rolls to produce any size product. This crusher is said to have a capacity of 40 to 50 tons per hr. and requires 15 to 20 hp.

The 16-in. roll crusher is similar to the larger unit in construction but does not include a feeder. It is made up with 16-in. diameter rolls in widths of 16 to 24 in. From 5 to 10 hp. is required to drive this machine.

Developments in Welding by Linde Air Products

The Linde Air Products Company, 30 East 42nd Street, New York, N. Y., announced an important addition to its acetylene generating equipment during the past year. This new automatic stationary generator, known as the Oxweld Type MP-5, is rated to deliver 1,000 cu.ft. of acetylene per hr., and thus takes its place as the highest-capacitied, medium pressure model now available. It is listed by the Underwriters' Laboratories, Inc. Its advent should be of great interest to users who want high capacity without operating two or more generators simultaneously. Its compactness and efficiency show intelligent design in every detail. The feed is of the gravity type. The mechanism is of a most advanced design, unlike previously employed gravity feed devices. The feed control unit is self-contained and is bolted to the inside of the carbide hopper.

Another Linde development of 1934 was a new welding head, known as the multiflame Lindewelding head, for use on W-17 or W-22 Oxweld blowpipes. The Lindeweld Process for pipe welding introduced about three years ago has been the means of greatly reducing pipe line installation costs, and



Automatic stationary acetylene generator.

the innovations incorporated in the new welding head will further reduce these costs by large amounts. The multiflame head consists of a special chromium-plated stem and tip, available in three sizes, their use depending upon the pipe size. Its radical departure from other blowpipe heads is the design of the tip to give three flames: a main welding flame and two smaller auxiliary flames, the latter so positioned as to preheat both edges of the vee ahead of the point of welding.

United Produces Both Washed and Procite-Processed Coals

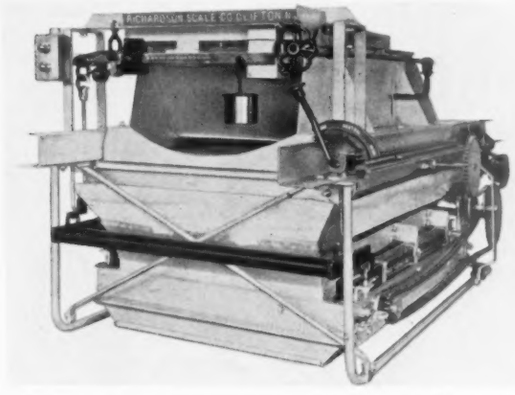
The United Electric Coal Companies are producing "Fidelity" washed coal at their Fidelity mine and plant in Perry County, Ill., one of the five operated by them in Indiana and Illinois. This coal is washed by the Koppers Rheolaveur system, which is said to absolutely clean the coal, remove all free impurities, and lower the ash content to the minimum. Coal chemically treated by the "Procite" process is also available. The Coal Sales Corp., Chicago, Ill., is the exclusive sales agent for the products of these mines.

The washing system at the Fidelity plant has a capacity of 600 tons per hr. After washing the coal is run over dehydrating screens and the 5/16-in. carbon size is run through a Carpenter drier which removes the excess moisture. This is one of seven sizes produced and combinations of these sizes are also available. Samples are analyzed daily at a laboratory at the mine and a sample analysis shows an increase of 1,549 B.t.u. in the fuel value of the coal due to the washing. By means of this careful and efficient washing and testing procedure, it is claimed, coal uniformly meeting specifications can be turned out day after day, eliminating the fluctuations in burning conditions usually found where ordinary coal is used.

The optional "Procite" processing takes place after the regular refining is completed. This processing consists of the automatic spraying and impregnating of the coal with a chemical solution that is made a part of the coal. This treatment, it is said, expedites oxidation of the coal during combustion at temperatures in excess of 700 deg. F. It has the effect of reducing the iron with which sulphur is always found from ferrous sulphide, with a melting point of 2140 deg. F., to ferric oxide, with a melting point of 2800 deg. This treatment, it is claimed, also prevents objectionable sheet clinkers, considerably reduces boiler tube slagging, prolongs the life of furnace linings, checks corrosion on tubes and surfaces, offers the same burning characteristics as low sulphur coal, and lowers maintenance and operating costs.

Measuring and Proportioning Device Also Checks Weights

The Richardson Scale Co., Clifton, N. J., announces the Conveyometer for accurate measurement and control as well as continuous feeding of single materials in process and correct proportioning of two or any number of ingredients prior to blending. The Conveyometer consists primarily of two small belt conveyors, one a measuring and feeding device, the other a weight-checking and delivery device.



The Richardson Conveyometer with beam scale for check weighing automatically.

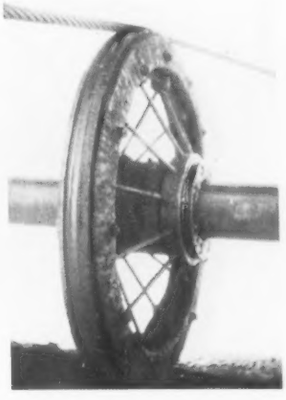
The two conveyors are mounted one above the other within the framework of the Conveyometer. The respective speeds of the two conveyors are so synchronized that each load is wholly contained upon the check-weighing conveyor for a short but adequate time in order to allow the scale beam to function properly and show an accurate balance. A tell-tale system operated by the scale beam shows a green light if the individual loading checks correct, a red light if it is overweight and no light at all if the load is shortweight or the supply of material fails.

The feed or measuring conveyor is a slow-moving belt conveyor of short centers driven by a system of escapement or intermittent gearing. The larger or driving gear is made in two segments, one with a number of teeth which engage with a corresponding number of teeth on the smaller driven gear, and the other an offset disk without teeth. This arrangement provides the interval between loads or cycles during which the automatic check weighing is done and verification of the measured load is possible. The speed of this conveyor is variable and the unit load can be varied by changing the setting of the feed gate and the poise on the scale beam. This feed conveyor is of enclosed construction and access to it is through a hinged door in the front housing.

The check-weighing conveyor is suspended from a system of steel scale levers of conventional design terminating in a graduated scale beam with a suitable poise. Both conveyors have moulded and flanged rubber belts which run over a series of tube spacers 2 in. apart between two roller chains. The belts are kept in position by stainless steel guides parallel to the travel of the belts and the chains, which travel on angle iron guides, operate on steel sprockets. The chassis is constructed of pressed steel shapes reinforced by cross members and supplemented by a well-braced tubular sub-frame. The tell-tale indicator is a sheet aluminum member carrying a 3-leg mercury switch and is entirely housed. Each shaft runs on double-seal, grease-packed ball bearings which require infrequent greasing.

Rubber-Faced Rolls Said to Have Many Advantages

The D. J. Murray Mfg. Co., Wausau, Wis., announces the Murray-Cornish rubber-faced rolls and sheaves which are intended for service wherever wire cable is used. Smooth operation and dependability resulting in savings on rope and power with a low maintenance cost are claimed. The sheave is fitted with anti-friction bushings to save power and reduce possibility of slippage of the cable. The sheaves are made in standard sizes 21, 30 and 48 in. in diameter but special diameters can be made. They are made of high-test cast iron with rubber facing in one solid piece for the smaller units and in segments for the larger units.



Rubber-faced sheave for wire rope.

Worthington Adds Two Units to Line of Centrifugal Pumps

The Worthington Pump and Machinery Corp., Harrison, N. J., has added two larger units to its Monobloc centrifugal pump group. These new pumps, of 3 and 4-in. sizes, are similar in design to the original smaller 1 to 2½-in. units of the line. This pump, besides being rigidly mounted on the motor frame, is supported by a foot resting on the base. The pump impeller is mounted directly on motor shaft and both pump and motor are bolted on one rigid base, thus relieving the pump from possible pipe strain. Additional improvements are in impeller design, renewable wearing rings, and balance rings said to eliminate end-thrust and put the stuffing box under suction pressure only. These pumps can be supplied with standard bronze, all bronze, or all iron fittings. Mounting can be either horizontal or vertical.

S K F Industries, Inc., announce the opening of a new branch store at 407 South 4th St., Minneapolis, Minn., with A. Kishkunas in charge. The new office carries a complete stock of S K F ball and roller bearings, pillow blocks, and hangers.

Cutter Heads Present Problem in Design and Manufacture

Fig. 1. Plain-blade cutter used in white sand, marl and clay.

Fig. 2. Toothed cutter for work in cemented gravel and clay.

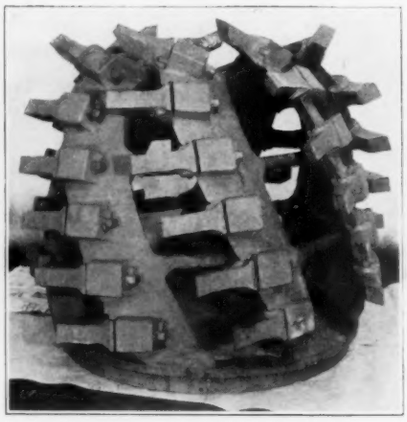


Fig. 3. A cutter designed for digging in coral rock.

"OF all the castings with which we come in contact," says Perry I. Nagle of the Pump Dept. of the American Manganese Steel Co., "there is none so difficult to design, none so difficult to manufacture, and none so likely to cause trouble in the field if not properly designed and executed as a revolving cutter. Also, the marginal range within which a cutter is either successful or otherwise is extremely limited, and if it is unsuccessful, there is not very much that can be done to make it a successful weapon."

According to Mr. Nagle, it is possible to design cutters only by visiting the operation, studying not only the conditions under which the cutter is to be used and the material it is to dig, but also the dredge on which it is to be used. The successful operation of a cutter requires the proper power for driving it, the proper sweep, and the proper breasting-line speed. Even after all these are established, unless the cutter is designed with the proper sweep and pitch angle the results will not be satisfactory.

It is for these reasons, as Mr. Nagle explains it, that, in every experience his company has had, it has been necessary, when supplying a cutter, not only to design the casting as a piece of equipment, but to inform the operators concerning such mechanical details as breasting-line speed, cutter power and hoist power. Advice must also be given on the proper shaft diameter and the proper length of ladder for most successful operation.

As examples of modern cutter design Mr. Nagle cites the tools illustrated. Fig. 1 shows a 6-blade plain-type cutter which has been used with success in Lake Okeechobee white sand and marl and in Mississippi River clay and mud. It is a one-piece casting and the blades are plain. It works without plugging.

For a special job involving the excavation of strata of cemented gravel, bowlders and clay the cutter shown in Fig. 2 was designed. Here the blades are provided with teeth which loosen the cemented gravel and do not become plugged in the clay.

In Fig. 3 is shown a rugged type designed for work in shot or unshot coral rock in Florida.

Among the troubles that may be experienced with cutters Mr. Nagle ranks as most important the failure to dig. Sometimes this failure, due to faulty design, results in breakage, as illustrated in Figs. 4 and 5. In other cases it is caused by filling or plugging with clay. Fig. 6 shows a good example of the annoyance caused by this fault in design.

The materials mentioned give some idea of the wide range of conditions that must be met satisfactorily and they lend support to Mr. Nagle's contention that the operation must be visited before the correct design can be developed. Modern methods have made it possible to execute the chosen design with a degree of refinement of which, as Mr. Nagle says, "any manufacturer could be proud."

Gas-Electric Locomotives Haul Norris Dam Concrete

The T. V. A. is using four 10-ton Plymouth-Westinghouse gas-electric locomotives to haul the nearly 1,000,000 cu. yd. of concrete to be used in the construction of Norris Dam. These locomotives have a starting tractive effort with 25-per cent. adhesion of 5,000 lb. and a continuous tractive effort of 1,650 lb. With a maximum safe speed of 23 mi. per hr. the locomotives have a free running speed of 15 mi. per hr. and a 10-mi. per hr. speed when operating at the continuous-tractive-effort rating. These locomotives were described and illustrated in a description of the Norris Dam crushed-stone and premixed-concrete plants published in the September, 1934, issue of PIT AND QUARRY.

Fig. 4. Faulty design often results in breakage.

Fig. 5. Inability to dig sometimes causes breakage.

Fig. 6. Failure to dig caused by filling or plugging.

MANUFACTURERS' PUBLICATIONS

Hydroseal Maximix Sand Pump. 12 p. (Bull. No. 634, Allen-Sherman-Hoff Co., Philadelphia, Pa.). Describes and illustrates the Hydroseal sand pump with Maximix rubber lining.

Dust Arrestors. 4 p. (Bull. No. DA-5, Parsons Engineering Corp., Cleveland, O.). Describes and illustrates the Parsons oval bag dust arrestors.

Longyear Core Drill. 8 p. (Bull. No. 37, E. J. Longyear Co., Minneapolis, Minn.). Describes and illustrates the Longyear Prospector, an improved light core drill.

Worthington Multi-V-Drive. 2 p. (Worthington Pump & Machy. Corp., Harrison, N. J.) Pamphlet illustrates various applications of this drive with Goodyear Emerald Cord belts.

Vibrating Screens. 16 p. (Cat. No. 1462, Link-Belt Co., Chicago, Ill.) Describes and illustrates the company's full line of vibrating screens with typical installations shown.

Locomotive Cranes. 16 p. (Cat. No. 1595, Link-Belt Co., Chicago, Ill.) Describes and illustrates the company's full line of locomotive cranes, including gasoline, Diesel, electric and steam powered units.

Reduced-Voltage Starters. 12 p. (GEA-1979, General Electric Co., Schenectady, N. Y.) Describes and illustrates the G. E. reduced-voltage auto-transformer-type starters, both manual and magnetic, for squirrel-cage induction motors.

Tractor-Mounted Air Compressors. 8 p. (Davey Compressor Co., Inc., Kent, O.) Describes and illustrates Davey air compressors mounted on Cletrac tractors.

Redler Continuous-Flow Conveyors. 16 p. (Stephens-Adamson Mfg. Co., Aurora, Ill.) Describes and illustrates the various types of Redler conveyors and various auxiliary devices.

Euclid Trac-Truk. (Euclid Road Machinery Co., Cleveland, O.) Describes and illustrates the new Euclid Trac-Truk and its application to different fields.

Compound Funnel Classifier. 4 p. (Bull. No. 23, Deister Machine Co., Fort Wayne, Ind.) Describes and illustrates the new Deister compound-funnel classifier and its adaptability to the grading of sand.

Pointers for Rock-Drillers. 156 p. (Ingersoll-Rand Co., New York, N. Y.) Describes the various types of air drills and accessories made by this company with suggestions for their selection, maintenance and use.

Fire Resistance of Gypsum Plaster. 8 pp. (Gypsum Association, Chicago, Ill.) Publication gives factual information on the fire protection afforded by gypsum plaster based on data from the reports of fire tests conducted by the Underwriters' Laboratories and by the Bureau of Standards.

Standard Specifications for Gypsum Plastering. 12 pp. (Gypsum Association, Chicago, Ill.) Gives complete specifications covering the mixing and application of the different kinds of gypsum plasters applied to various bases. There are also included specifications covering the mixing and application of the usual type of finishes commonly employed.

Brush Phase of Motor Maintenance. 64 pp. (Ohio Carbon Co., Lakewood, O.) Deals with the causes and effects of sparking, excessive wear, etc., of brushes, commutators and slip-rings on direct and alternating current motors and generators.

Portable Air-Cooled Compressors. 32 pp. (Sullivan Machinery Co., Chicago, Ill.) Describes and illustrates the new line of Plus Portable 2-stage, air-cooled compressors made by this company.

Refractories for Rock Products Industries. 4 pp. (Bull. No. 302, General Refractories Co., Philadelphia, Pa.) Describes the variety of refractories made by this company for the cement, lime, gypsum and other non-metallic mineral industries.

Plastic Fire Brick. 8 pp. (Bull. No. 203, General Refractories Co., Philadelphia, Pa.) Describes the plastic fire brick made by this company for temperatures up to 3,000 deg. F.

Link-Belt Motorized Reducers. 20 pp. (Cat. No. 1515, Link-Belt Co., Chicago, Ill.) Describes and illustrates new line of motorized speed reducers in which the motor is mounted directly on the side of the reducer housing.

Trip-Free Air Circuit Breakers. 4 pp. (Bull. No. GEA-1662A, General Electric Co., Schenectady, N. Y.) Describes and illustrates the line of trip-free air circuit breakers made by this company for buildings, industrials and power stations.

Worthington Diesel Engines. 16 pp. (Bull. S-500-B6D, Worthington Pump and Machinery Corp., Harrison, N. J.) Describes and illustrates the vertical, four-cycle, direct-injection Diesel engines, Types B, C, D and E, made by this company.

Preformed Wire Rope. 20 pp. (Broderick & Bascom Rope Co., St. Louis, Mo.) Booklet "What You Should Know About Flex-Set Preformed Construction Wire Rope" describes and illustrates the features and advantages of this type of construction.

Cummins Diesel Engines. 48 pp. (Cummins Engine Co., Columbus, Ind.) Describes and illustrates the complete line of Cummins Diesel engines, their design and construction, and their application to various fields.

Plymouth Diesel Locomotives. 8 pp. (Bull. FLD, The Fate-Root-Heath Co., Plymouth, O.) Describes and illustrates the Plymouth Model FLD6, DLD8, and DLD10 Diesel locomotives.

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Classified Buyers' Guide

A Directory of Pit and Quarry Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Abrasives
*Pangborn Corp.

Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.

Agitating Ladders (Dredge)
*Eagle Iron Works

Agitators, Thickeners and Slurry Mixers
*Hardinge Co.

Air Compressors (Portable)
Gardner-Denver Co.

Air Compressors (Stationary)
Gardner-Denver Co.

Air-Conditioning Equipment
*Pangborn Corp.

Air Filters
*Blaw-Knox Co.

Air Pumps
Gardner-Denver Co.

Air Separators
Gay, Rubert M.
*Hardinge Co.
*Pangborn Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Alloys (Steel)
Cement Mill Equip. Co.
Chain Belt Co.
Ryerson & Son, Joseph T.

Ash and Refuse-Handling Equipment
Allen-Sherman-Hoff Co.
American Manganese Steel Co.
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.

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*Hardinge Co.
*Link-Belt Co.

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*Blaw-Knox Co.

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*Harnischfeger Corp.
*Lima Locomotive Works, Inc.

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*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

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*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Baskets (Dipping)
Buffalo Wire Works Co.

Bearings (Anti-Friction)
Hetherington & Berner, Inc.
*Link-Belt Co.
Sprout, Waldron & Co.

Belt Drives
Chain Belt Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belting
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Self-Vulcanizing Rubber Co.
Sprout, Waldron & Co.

Belt Lacings
Flexible Steel Lacing Co.

Belting (Multiple V)
Goodyear Tire & Rubber Co.

Bin-Dicator
Ripley Mfg. Co.

Bin Gates
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Chain Belt Co.
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engr. Works
Sprout, Waldron & Co.

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Allen-Sherman-Hoff Co.

Bins (Steel)
*Blaw-Knox Co.
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equip. Mfg. Co.
Sprout, Waldron & Co.

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Blasting Supplies
*Ensign-Bickford Co.

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*Sauerman Bros., Inc.
Sprout, Waldron & Co.

Blowers
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Bodies (Motor Truck, Concrete Mixing)
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Jaeger Machine Co.

Borings, Core
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Pennsylvania Drilling Co.

Bronze Work (Ornamental)
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National Wire Cloth Co.
Smith Wire & Iron Works, F. P.
*Tyler Co., W. S.

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*Link-Belt Co.

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*Hendrick Mfg. Co.
*Link-Belt Co.
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Sprout, Waldron & Co.

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Smith Engr. Works
Sprout, Waldron & Co.

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Chain Belt Co.
*Eagle Iron Works
*Hardinge Co.
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Sprout, Waldron & Co.

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Central Concrete-Mixing Plants (Complete)
Sprout, Waldron & Co.

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Ryerson & Son, Joseph T.

Chain Drives
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*Link-Belt Co.

Chain (Elevating and Conveying)
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Chain Belt Co.
Cross Engr. Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Sprout, Waldron & Co.

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Chain Belt Co.
Cross Engr. Co.
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Sprout, Waldron & Co.

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*Hardinge Co.
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Knickerbocker Co.
Lewistown Foundry & Machine Co.
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Technicoal Sales Corp.

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*Allis-Chalmers Mfg. Co.
Bonnot Co.
Gay, Rubert M.
*Hardinge Co.
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Universal Road Machy. Co.

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*Deister Concentrator Co.

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*Link-Belt Co.
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Haiss Mfg. Co., Geo.
*Link-Belt Co.
Sprout, Waldron & Co.

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Robinson, E. Gwynn

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Chain Belt Co.
Cross Engr. Co.
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Robinson, E. Gwynn
Smith Engr. Works
Sprout, Waldron & Co.
*Universal Crusher Co.
Universal Road Machy. Co.

Conveyors (Ready-Mixed Concrete)
*Blaw-Knox Co.
Chain Belt Co.
Haiss Mfg. Co., Geo.
Jaeger Machine Co.
*Link-Belt Co.

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*Link-Belt Co.
Sprout, Waldron & Co.

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*Harnischfeger Corp.
*Lima Locomotive Works, Inc.
*Link-Belt Co.

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*Harnischfeger Corp.

Crusher Parts
American Manganese Steel Co.
*American Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

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*Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bonnot Co.
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*Kennedy-Van Saun Mfg. and Eng. Corp.

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*Allis-Chalmers Mfg. Co.
Good Roads Machy. Corp.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Nordberg Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works
*Universal Crusher Co.

Crushers (Ring)
*American Pulverizer Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bonnot Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equip. Mfg. Co.

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*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bonnot Co.

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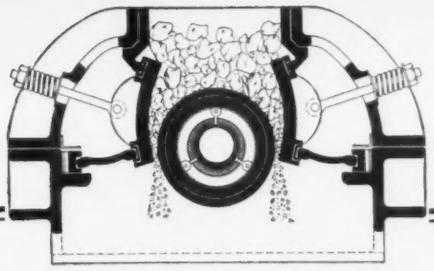
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bonnot Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.

*** See also information in the 1934 Pit and Quarry HANDBOOK.**



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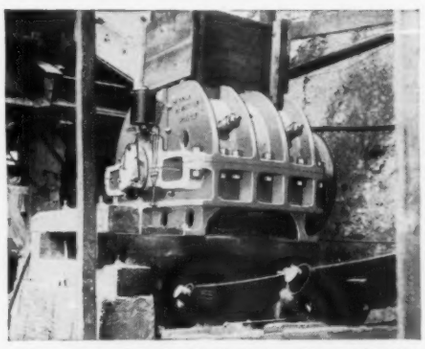

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Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Dragline Excavators
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*Tyler Co., W. S.

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Allen-Sherman-Hoff Co.
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Raymond Bros. Impact Pulv. Co.

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*Pangborn Corp.
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*Pangborn Corp.
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*Nordberg Mfg. Co.

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*Nordberg Mfg. Co.

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*Kennedy-Van Saun Mfg. and Eng. Corp.
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Smith Wire & Iron Works, F. P.

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Smith Wire & Iron Works, F. P.

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*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
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Universal Road Machy. Co.

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Smith Wire & Iron Works, F. P.

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*Taylor Forge & Pipe Works

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*Harnischfeger Corp.
Hetherington & Berner, Inc.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equip. Mfg. Co.
*Sauerman Bros., Inc.
Smith Engr. Works
Sprout, Waldron & Co.

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*Hendrick Mfg. Co.
*Link-Belt Co.

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American Manganese Steel Co.
Chain Belt Co.
Good Roads Machy. Corp.
*Link-Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Indicators (Bin)
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*Allis-Chalmers Mfg. Co.
Bonnot Co.
Cement Mill Equip. Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

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*Hardinge Co.

Lime-Handling Equipment
*Hardinge Co.
*Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

Lime and Hydrating Plants
*Hardinge Co.

Lime Kilns
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Liquid Rubber
Self-Vulcanizing Rubber Co.

Loaders and Unloaders
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Robinson, E. Gwynn
Sprout, Waldron & Co.

Locomotives (Diesel)
*Fate-Root-Heath Co.
*Plymouth Locomotive Works

Locomotives (Diesel-Electric)
*Fate-Root-Heath Co.
*Plymouth Locomotive Works

Locomotives (Electric, Gas and Steam)
*Fate-Root-Heath Co.
*Lima Locomotive Works
*Plymouth Locomotive Works

Locomotives (Gas-Electric)
*Fate-Root-Heath Co.
*Plymouth Locomotive Works

Locomotives (Oil-Electric)
*Fate-Root-Heath Co.
*Plymouth Locomotive Works

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
American Manganese Steel Co.
Ryerson & Son, Joseph T.

Manganese Steel (Plates and Sheets)
American Manganese Steel Co.
Ryerson & Son, Joseph T.

Mill Liners and Linings
American Manganese Steel Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Fdy. & Mch. Co.
Raymond Bros. Impact Pulv. Co.
Sprout, Waldron & Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*Harnischfeger Corp.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Nails
*American Steel & Wire Co.
Ryerson & Son, Joseph T.

Netting (Locomotive Stack)
Buffalo Wire Works Co.
Smith Wire & Iron Works, F. P.
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Packings
Goodyear Tire and Rubber Co.
Self-Vulcanizing Rubber Co.

Partitions (Wire)
Buffalo Wire Works Co.
National Wire Cloth Co.
Smith Wire & Iron Works, F. P.

Paving Mixers
Jaeger Machine Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
Cross Engr. Co.
*Hendrick Mfg. Co.
Morrow Mfg. Co.
Ryerson & Son, Joseph T.
Sprout, Waldron & Co.

Plastic Rubber
Self-Vulcanizing Rubber Co.

Pipe, Dredge (Floating and Shore)
*Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Ryerson & Son, Joseph T.
*Taylor Forge & Pipe Works

Plug Valves (See Valves)

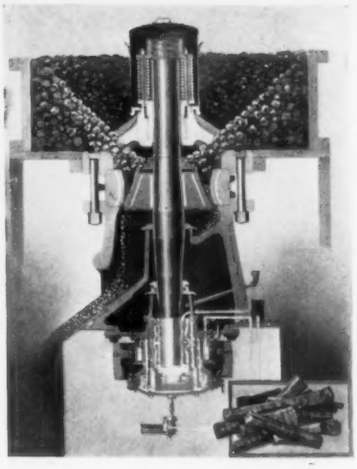
Pneumatic Drills (See Drills, Rock)

Portable Conveyors
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Sprout, Waldron & Co.

Portable Crushing and Screening Plants
Good Roads Machy. Corp.
Pioneer Gravel Equip. Mfg. Co.
*Universal Crusher Co.

Portable Engines (See Engines—Internal Combustion)

*** See also information in the 1934 Pit and Quarry HANDBOOK.**



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The Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to produce a greater tonnage than any other crusher of a given size, with half the power per ton of ore. This crusher can be equipped with a synchronous motor in its pulley, or driven by flat or V-belt from a standard motor.

The Savings Effected with this crusher are astounding:
In cost of Maintenance.....80%
In Power.....The entire cost of crusher and motor in pulley is amortized annually.

Sieving test on glacial gravel crushed at the rate of 18 tons per hour, with No. 19 crusher set to ⅛ in., and using less than 15 hp., follows:

Minus ⅜ in.	100%
Plus 3 mesh	21½%
Minus 3—Plus 4	17%
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15%
Minus 48—Plus 100	4%
Minus 100	5½%

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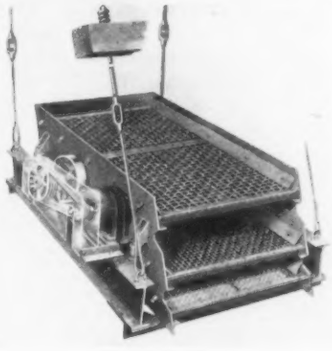
Double Strength

High-Class Workmanship and Material

Greatest Capacity Guaranteed



No repair parts sold after 4 years in use except screen cloth

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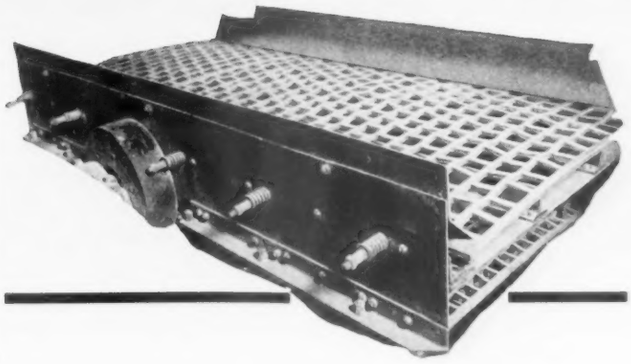

Your *Vibrating Screens Will Do More With* HENDRICK DOUBLE CORRUGATED

For accuracy, efficiency, high capacity and long life, use Hendrick Double Corrugated Vibrating Screen Plates. Made from High Carbon Steel or Abrasive Resisting Steel to meet your screening conditions.

For any of your other screening needs, use Hendrick. In flat plate, revolving screen sections or segments, buckets and troughs, you'll receive excellent workmanship and the characteristic prompt Hendrick service.

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Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Index to Advertisers on Page 72

Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

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Sprout, Waldron & Co.

Pulleys (Wing)
Sprout, Waldron & Co.

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*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy Co.

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*American Pulverizer Co.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
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*Universal Crusher Co.

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Allen-Sherman-Hoff Co.
*Morris Machine Works

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Chain Belt Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works

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Chain Belt Co.

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*Hardinge Co.
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McLean Welded Products Corp.
Ryerson & Son, Joseph T.

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Ryerson & Son, Joseph T.

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Cross Engr. Co.

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*Pangborn Corp.
Pulmosan Safety Equip. Corp.

Safety Equipment
Pulmosan Safety Equipment Corp.

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*Pangborn Corp.

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*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works

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*Hardinge Co.

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*Link-Belt Co.
Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works

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*Link-Belt Co.
Pioneer Gravel Equip. Mfg. Co.
*Sauerman Bros., Inc.

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*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Buffalo Wire Works Co.
Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
*Deister Concentrator Co.
Deister Machine Co.
*Eagle Iron Works
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Haiss Mfg. Co., Geo.
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*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
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*Nordberg Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Productive Equip. Corp.
Smith Engr. Works
Smith Wire & Iron Works, F. P.
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.
Universal Road Machy. Co.

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*Allis-Chalmers Mfg. Co.
Buffalo Wire Works Co.
*Deister Concentrator Co.
Deister Machine Co.
Good Roads Machy. Corp.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Nordberg Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Productive Equip. Corp.
Smith Engr. Works
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*Tyler Co., W. S.
*Universal Crusher Co.

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*Tyler Co., W. S.

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*Allis-Chalmers Mfg. Co.
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*Eagle Iron Works
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Hetherington & Berner, Inc.
*Link-Belt Co.
McLanahan and Stone Corp.
Sprout, Waldron & Co.

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*Harnischfeger Corp.
*Lima Locomotive Works, Inc.
*Link-Belt Co.

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Chain Belt Co.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
Chain Belt Co.
Hetherington & Berner, Inc.
*Link-Belt Co.

Soft Stone Eliminators
Knickerbocker Co.

Speed Reduction Units
Chain Belt Co.
*Link-Belt Co.

Spouts (See Chutes and Chute Liners)

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*Deister Concentrator Co.

Sprockets and Chain
American Manganese Steel Co.
Chain Belt Co.
*Link-Belt Co.
Sprout, Waldron & Co.

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Stairs (Mine)
Smith Wire & Iron Works, F. P.

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(See Alloys—Steel)

Steel (Abrasion Resisting)
Ryerson & Son, Joseph T.

Steel (Bars, Shapes, Plates, etc.)
Ryerson & Son, Joseph T.

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Steel Inclines (See Inclines, Steel)

Steel Plate Construction
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Sprout, Waldron & Co.

Storage Equipment
Chain Belt Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Sauerman Bros., Inc.

Sweeping Systems
Allen-Sherman-Hoff Co.

Tanks
*Hendrick Mfg. Co.
*Link-Belt Co.

Tanks (Sand-Settling)
Good Roads Machy. Corp.
*Link-Belt Co.
Morrow Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

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*Hardinge Co.

Tires (Truck)
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
*Fate-Root-Heath Co.
*Plymouth Locomotive Works

Tramways (Aerial)
*American Steel & Wire Co.

Transformers
*Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Chain Belt Co.
*Link-Belt Co.

Trippers
Chain Belt Co.
Good Roads Machy. Corp.
*Link-Belt Co.

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Truck Mixers
*Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Underground Loaders
*Allis-Chalmers Mfg. Co.

Unloaders (Box Car)
Chain Belt Co.
*Link-Belt Co.
Robinson, E. Gwynn

Variable Speed Reducers or Transmissions
Chain Belt Co.
*Link-Belt Co.

Valves (Pump)
*Taylor Forge & Pipe Works

Vibrating Screen Plate
Chicago Perforating Co.
Cross Engr. Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Tyler Co., W. S.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works
*Tyler Co., W. S.
Universal Road Machy. Co.

Weighing Equipment (Automatic)
*Blaw-Knox Co.

Welding & Cutting Equipment
McLean Welded Products Corp.
Ryerson & Son, Joseph T.

Welding Supplies
American Manganese Steel Co.
*American Steel & Wire Co.
McLean Welded Products Corp.
Ryerson & Son, Joseph T.

Well Drills (See Drills—Well)

Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works

Winches and Capstans
Chain Belt Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Wire & Cable (Electric)
*American Steel & Wire Co.

Wire Cloth
Buffalo Wire Works Co.
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
National Wire Cloth Co.
Smith Wire & Iron Works, F. P.
*Tyler Co., W. S.

Wire Rope
*American Steel & Wire Co.
Buffalo Wire Works Co.
Ryerson & Son, Joseph T.
Williamsport Wire Rope Co.

Wire-Rope Fittings
*American Steel & Wire Co.
Buffalo Wire Works Co.
Ryerson & Son, Joseph T.
Williamsport Wire Rope Co.

Wire Rope Slings
*American Steel & Wire Co.
Williamsport Wire Rope Co.

Wire (Welding)
*American Steel & Wire Co.
McLean Welded Products Corp.
Ryerson & Son, Joseph T.

Worm Gears (See Gears and Pinions)

*** See also information in the 1934 Pit and Quarry HANDBOOK.**

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More Capacity!

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Positive Uniformity!

Greater Efficiency!

The capacity of grinding mills is materially increased by this new Gayco Centrifugal Air Separator. Fines are removed as they are made.

It delivers an absolutely uniform product of any fineness desired from 60 to 400 mesh with greater capacity and lower power cost than is possible with any other type of air separator.

It is slow speed, requiring very little power. Repair costs are practically nothing—the only wearing parts are the steel cut gears and bearings enclosed in a dust proof casing.

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Crushing, Screening, Washing

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BIN-DICATOR

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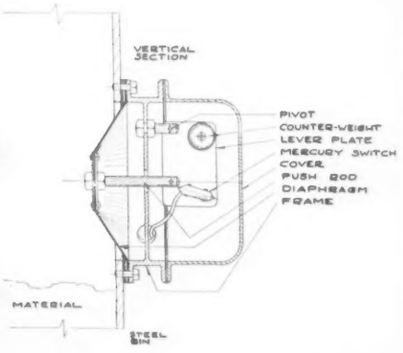
for New Economies in Plant Operation



AUTOMATIC INDICATION AND CONTROL of level of material in bins, and of feeding material to conveyors and elevators. For all pulverized or granular materials. Simple to install—positive in action. Requires no maintenance.

FOUR YEARS

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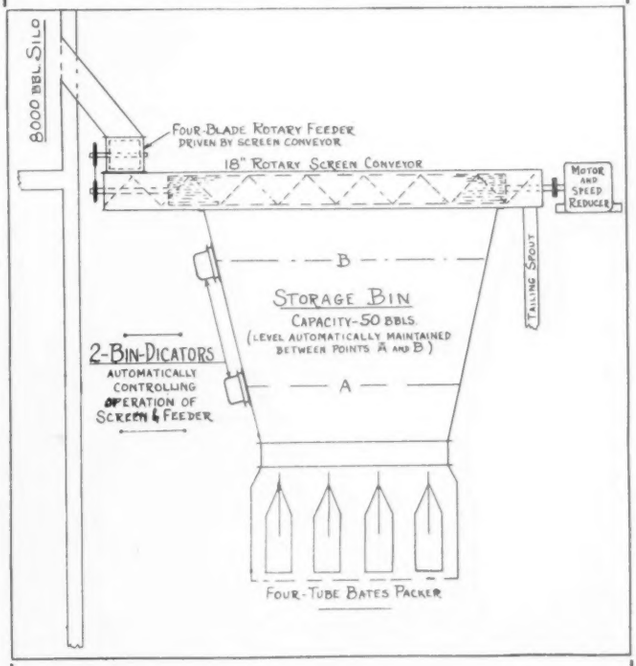

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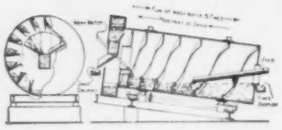
HARDINGE
WASHERS



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3-4 yd., 1 yd., 1 1-4 yd., 1 1-2 yd., 1 3-4 yd. & 2 yd.
(A TYPE AND SIZE FOR EVERY JOB)
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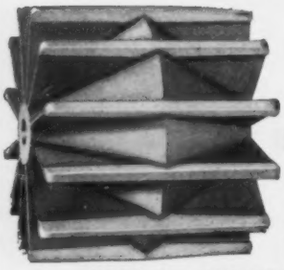
SAVE YOUR CONVEYOR
and
Elevator
Belts *with*
SPROUT-WALDRON
Wing Pulleys



Interchangeable with standard pulleys. Nothing can lodge between belt and pulley.

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Elevating, Conveying and Transmission Equipment

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since 1889 with
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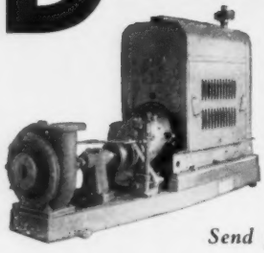

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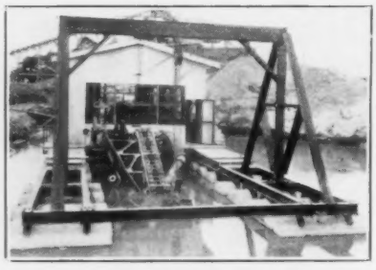
LOWER YOUR COST



Will eliminate stoppages and slug pumping—insuring an even, constant feed of solids to the suction nozzle—with less power—greatly decreasing the cost per yard of material produced.

Write for descriptive literature and let us tell you how this can be done with your dredge.

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Des Moines, Iowa

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Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

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CRUSHERS—Double roll and Sledge Wedge Crushers, for practically any product. Capacities to 1000 tons an hour.

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Lowest Cost per Cu. Yard

Quality in a Loader is even more important, today, than ever before. Your equipment has got to pay for itself on a small profit margin. You cannot afford a machine that won't **stand up.** You know a HAISS **will.** And you also know that it is easier to handle and does **a bigger day's work.**

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MODEL "27" 2 yds. per min.
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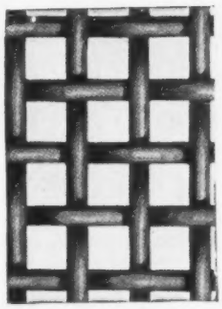
5 Star Features

- ★ Lasts five times as long as cloth made of ordinary steel.
- ★ Withstands vibration without crystallization.
- ★ Super-tough to resist abrasion.
- ★ Maintains accuracy throughout life of screen.
- ★ Has outworn other special alloy cloths.



in National SPECIAL Nat-Aloy Wire Cloth

Nat-Aloy cloth developed from a special alloy steel. It possesses the maximum of resiliency and springs back into shape after the screening load is removed, thus preventing permanent sagging and preserving the shape of the screen indefinitely.

Stock Shipments *Attractive Prices*

NATIONAL WIRE CLOTH CO.
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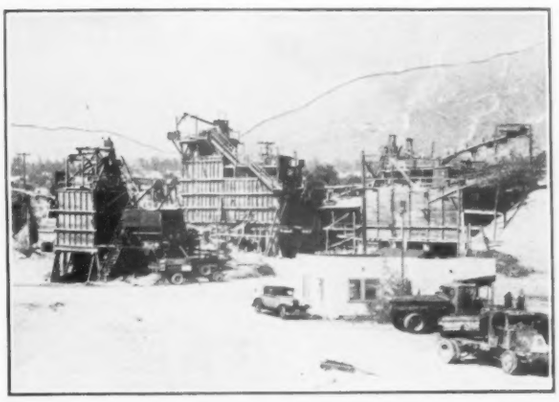
helped this West Coast operator to recover a lost market.

Unable to produce material acceptable for City and County work, due to excessive abrasion loss in Los Angeles Rattler tests, Ducey & Attwood Rock Co., East Pasadena, Calif., installed a Knickerbocker Soft Stone Eliminator.

They now are economically producing material that meets all City and County specifications relative to abrasion loss and soft stone content. Let us tell you about their problem and its solution.

THE KNICKERBOCKER COMPANY, 603 Liberty St., Jackson, Michigan



RENEW BELTs

with an Application of SELFVULC

EVEN if your old conveyor belt is worn down to canvas like the one shown above—DON'T THROW IT AWAY!

Resurface it with SELFVULC—the Self-curing Plastic Rubber Compound—and you will have a belt as good as new that will last as long as the original.

Scores of plants are reducing replacement costs by the use of SELFVULC to stop the ravages of abrasion and corrosion.

SELFVULC is easily applied by your own workmen, without removing the belts from pulleys. It is "first aid" against wear and tear and no storeroom should be without it. Give SELFVULC a test on your conveyor belts or equipment by ordering the Special Trial Unit described on coupon.

Selfvulcanize to economize in lining chutes, hoppers and agitators, covering pipes, cables and surfaces exposed to wear in flumes, centrifugal pumps, tube mills, separators, dredging equipment and conveyors.

MAIL COUPON FOR BULLETIN TODAY

SELF-VULCANIZING RUBBER CO., INC.
605 West Washington Blvd.
Chicago, Ill.

☐ Please send me your SELFVULC Bulletin.

☐ Enclosed is my order for a Trial Outfit including a 25 lb. drum of SELFVULC with Bonding Solution, Cleaning Fluid and tools for application, at $37.50.

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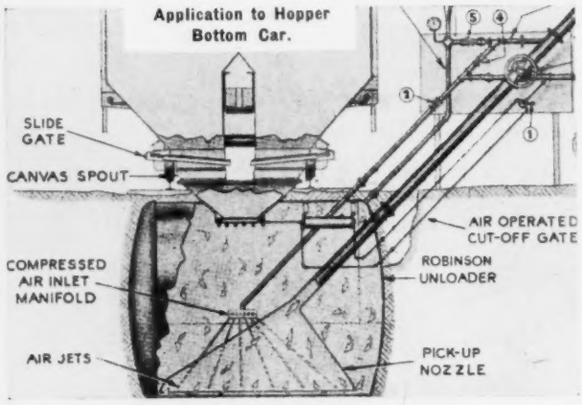
Write for discounts in larger quantities.

Robinson Air Activated Conveyor



SIMPLICITY—SPEED—ECONOMY

for conveying any pulverized material.

Record established on Lock and Dam Job No. 6 Trempealeau, Wis., and its performance in Cement Mill warranted its undoubted selection to convey 1,100,000 barrels bulk cement on a large Dam Job in West Virginia.

Sole Manufacturer and Distributor

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NEW! FILTER POUCH AM-15

Gives Better Protection Against Dusts!

Simply attach new Filter Pouch AM-15 to your present "M" Model Pulmosan Respirators to get extra high filtering efficiency and low breathing resistance, even in high silica dust concentrations. Small cost. Write for details and prices.

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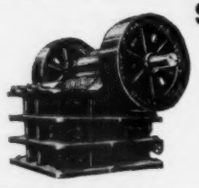
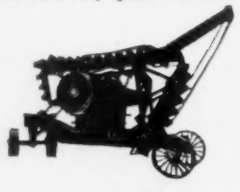
PULMOSAN "M" TYPE DUST RESPIRATORS

UNIVERSAL CRUSHERS

STATIONARY OR PORTABLE



in any combination with ELEVATORS, SCREENS, CONVEYORS, CRUSHING ROLLS, PULVERIZERS, BINS.
There is a size and a style to meet specifications in every phase of the industry.



Permanent plant operators are finding it profitable to use our portable plants to supplement their present equipment.
Tell us your needs. Our engineers will help solve your problem.
Catalog mailed on request.

UNIVERSAL CRUSHER CO. 619 C. AVE. W. CEDAR RAPIDS, IOWA

ALLIGATOR

TRADE MARK REG. U.S. PAT. OFFICE

STEEL BELT LACING

NEARLY a thousand belts per hour are laced with Alligator Steel Belt Lacing, day in day out, year in year out. Easy, rapid application with a hammer as the only tool; the hammer-clinched, vise-like grip on the belt ends, preventing friction of the plies; the patented, sectional, steel rocker pin which absorbs friction in the hinged joint; the great surplus of strength and long service—only Alligator Steel Belt Lacing combines these features which make it the choice of millions of belt users. Smooth on both sides. Easily separable. Reliable both on light and heavy duty drives. Eleven sizes. Made also in Monel Metal. Sold at wholesale and retail throughout the world.

FLEXIBLE STEEL LACING CO.
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In England at 133 Finsbury Pavement, London, E. C. 2

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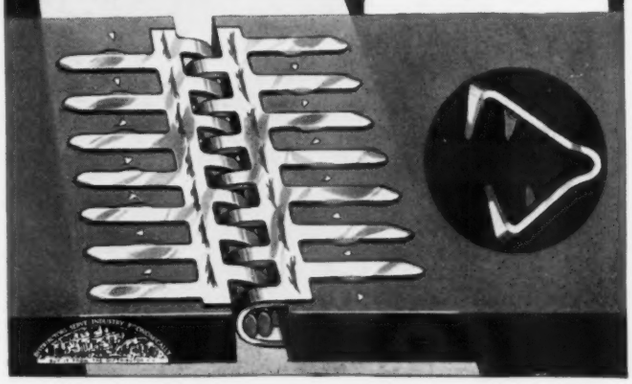

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..that's why JAEGER TRUCK MIXERS Outsell All Others

Because they offer every facility for the faster delivery of better concrete ("Dual-Mix" action, 1-man chute, dual controls, rapid accurate water tank and patented discharge) Jaeger Truck Mixers get most of the jobs, serve them at lowest cost, and continue to outsell all other makes. Sizes 1 to 5 cubic yards.

Write for details, prices.

1-Man Spout Saves Minutes on Every Trip.

THE JAEGER MACHINE CO. 602 Dublin Ave., Columbus, Ohio

BUFF-ALOY!

SUPER-WEAR WIRE CLOTH!

Standard size meshes in stock.
Special weaves made to order.

Screening costs are due for a big slump. BUFF-ALOY gives a new lease of life to screen equipment and reduces replacement expense to a minimum. It is made from a special alloy wire developed by our engineers in our own laboratory—and tested in the toughest kind of screening service. It pays to specify BUFF-ALOY for all your screens—it is the modern abrasive resisting wire cloth.

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NRA

BUFFALO WIRE WORKS COMPANY
(Formerly Scheeler's Sons) Established 1869
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COMPOUND FUNNEL CLASSIFIER

For sizing minus 5/16" gravel and sand, and for cleaning it by washing out silt and other light impurities.

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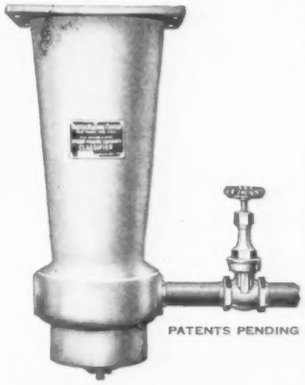
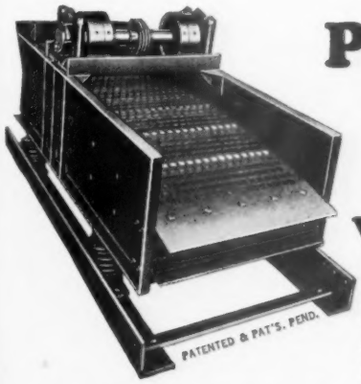


PATENTS PENDING



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Improved Heavy Duty

VIBRATING SCREEN

Built in all standard sizes and in from one to three decks.

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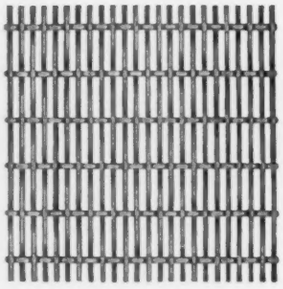
1933 EAST WAYNE STREET FT. WAYNE, IND.



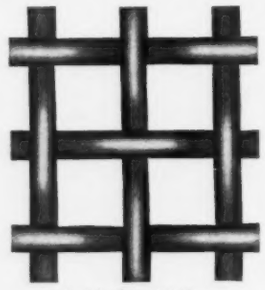
Rolled Slot

ALLOY No. 2

A proven Screen which will not only withstand vibration and resist abrasion, but will save you many replacement costs. Just what you are looking for.

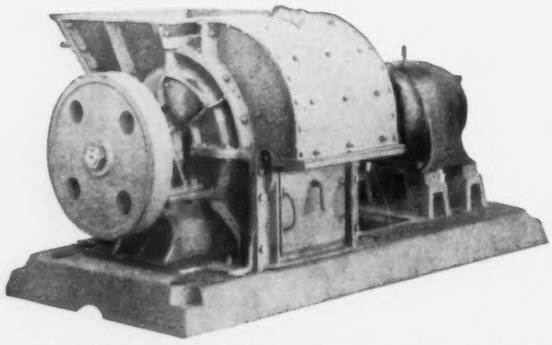
To be had in Square Mesh and Rolled Slot.

Once Tried—ALLOY No. 2—Always Used



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
3574 E. 78th St. CLEVELAND, OHIO



AMERICAN Ring All-Steel Crusher with Metal Trap, rear view, showing heavy cast iron bedplate.

AMERICAN *ROLLING RING* CRUSHER

LOW FIRST COST makes the American Crusher a prime investment. Easy to install, dismantle and move.

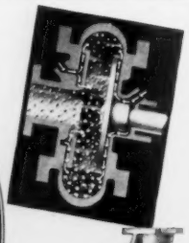
LOWER OPERATING COST because the American takes less power per ton of product. Flexible rotor assures protection from injury of tramp iron.

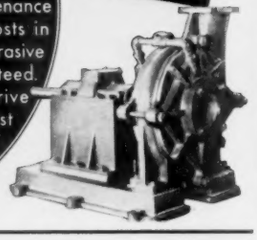
LOWER MAINTENANCE COST as the Rolling Rings wear many times longer than hammer surfaces.

Write today for facts on why the American Rolling Ring Crusher gives a more uniform product, with minimum fines and no slivers or chips.

AMERICAN PULVERIZER COMPANY
1289 Macklind Ave., Dept. P.Q. St. Louis, Mo.

HYDROSEAL DREDGE PUMP





Unique principle of hydrosealing both sides of the impeller against abrasive wear, cuts maintenance to a fraction and saves ⅓ in power costs in pumping sand, gravel, rock and other abrasive materials—Estimated economies guaranteed. Sizes 2" to 22", pulley or motor drive. Descriptive Catalog sent on request

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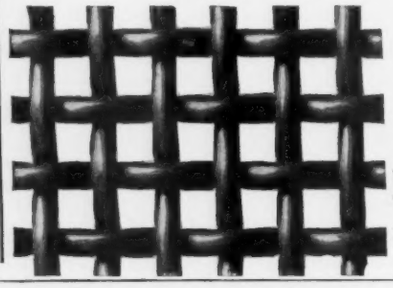

- Ty-Rod
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- Press Lock

The W. S. Tyler Company
Cleveland, Ohio

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NON-CHOKING TYPE CONCAVES

HAVE IMPROVED CRUSHER—OPERATION FOR OTHER USERS . . . Why not for you?

Our non-choking concaves have been designed along lines dating back through many years of experience with GATES AND McCULLY CRUSHERS and our designs do not infringe any valid claims of any patent.

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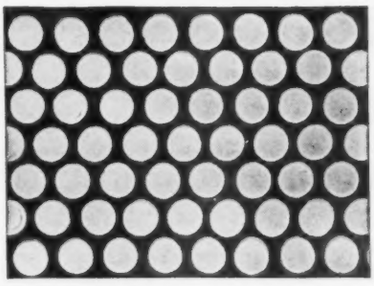
Advertise your wants and surplus equipment in

Pit and Quarry
with which is consolidated
CEMENT-MILL & QUARRY

MAXIMUM SCREEN LIFE



with MORROW SCREEN PLATES

THE material and the workmanship that go into the manufacture of Morrow Screen Plates are prime factors in their durability—but in addition, these perforated plates have some natural advantages that contribute to long life.

They are made of solid one-piece Morrow Metal, entirely free from joints and intersections that cause internal wear—nothing to become loose or change in mesh, no uncertainty or inaccuracy. Morrow-equipped screens mean maximum wear resistance.

They are ideal for preparing coal, sand, gravel, stone and other bulk materials of the abrasive type that are hard on ordinary screens. They are easy to install or replace without fitting or stretching. They require less incline and take less headroom. Whenever Morrow Screen Plates can be used, they show a real saving.

Furnished in a variety of sizes and perforations—and carried in stock for promptly filling your orders. Inquiries invited.

Send for Bulletin 57, which describes the complete Morrow line.

THE MORROW MANUFACTURING CO.
WELLSTON, OHIO

MORROW
PERFORATED METAL

P&H
HAS SPEEDED UP *the* DIGGING CYCLE

FOR A BIGGER DAY'S WORK WITH P&H ELECTRIC DRIVE

Abundant horsepower . . . faster swinging balanced machinery units on the main working frame . . . less counterweight . . . these are some of the reasons why P&H Ward Leonards are big producers. In speeding up the swing as high as 3½ R.P.M., P&H engineers have licked the real problem of faster digging. Remember that the swing absorbs nearly 67% of the digging cycle. . . . If you've got a big job in dirt or rock, we will present some facts that will interest you. Better investigate these P&H Ward Leonards. Their modern design does things to handling costs.

HARNISCHFEGER CORPORATION, *Est., 1884,* **Milwaukee, Wis.**

P&H WARD LEONARD ELECTRIC EXCAVATORS

4451 W. National Avenue, Milwaukee, Wis.

Warehouses and Service Stations:

Hoboken Memphis Jacksonville Seattle
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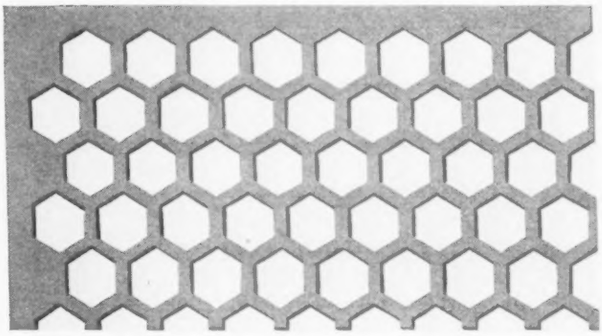
CROSS

scores again with



HEXCREEN

The new type Perforated Plate, developed by Cross Engineers and dedicated to higher screening efficiency. It combines at once the two features found only in HEXCREEN:—

○ **Round Hole Accuracy**
□ **Square Hole Capacity**

It offers the economical answer to your screening problems. Write for the new HEXCREEN Bulletin.

CROSS ENGINEERING CO.
Sales Representatives in all Principal Cities
Carbondale, Pennsylvania

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CENTRIFUGAL PUMPS
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DREDGES
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STEAM ENGINES

For abrasive mixtures, corrosive liquids, or clear water. Any capacity, head, or method of drive.

For sand and gravel production, water supply reservoirs, filling in, or waterways improvements.

Vertical reciprocating type, single and double cylinders, compound and triple expansion, 3 to 1000 hp.

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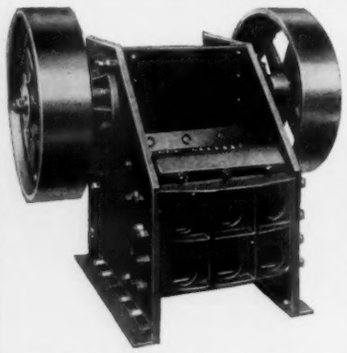
Baldwinsville, N. Y.



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ROCK CRUSHERS

SURPRISINGLY RUGGED, EFFICIENT AND ECONOMICAL. We also manufacture Bucket Elevators, Conveyors, Revolving and Vibrating Screens, Scrubbers, Feeders. Complete Plants for producing Crushed Rock—Sand and Gravel.

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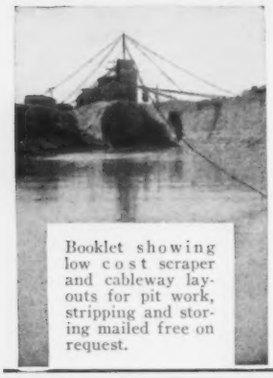
GOOD ROADS MACHINERY CORP.
KENNETT SQUARE, PA.

For Digging—Stripping—Stock-Piling



Booklet showing low cost scraper and cableway layouts for pit work, stripping and storing mailed free on request.

If you have a project that calls for digging and moving materials distances of 200 to 1500 ft., it is probable that you can cut costs by using a Sauerman machine. It is just a question of which type to use—cableway or scraper.

Sauerman Slackline Cableways are in a class by themselves for work where materials must be lifted from under water and conveyed to an elevated bin, screening plant or storage pile.

Sauerman Drag Scrapers are most economical on stripping work, digging dry gravel, stock-piling and reclaiming.

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GUARANTEED SCREENING SERVICE

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THE DEISTER CONCENTRATOR CO.
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538 South Clark St., Chicago, Ill.

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- ☐Belt lacing
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5—4x20, 5x26, 5x30, 6x35, same type.
3—3 and 5 roll Raymond High Side Mills.
1—5 roll Raymond Low Side Mill.
3—6′x35′ Rotary Steam Tube Dryers.
1—No. 2 Sturtevant Ring Roll Mill with 10′ separator, elevator, complete.
5—Air Classifiers, 30″, 10′, 12′, 14′.
1—7″x24″ Sturtevant Jaw Crusher, set to ½″.
1—36″x36″, 4XC Gruendler Swing Hammer Mill.
1—36″x24″ Jeffrey, Type D Hammer Mill.
4—Symons Cone Crushers, 4′, 5½′, 7′.
12—Crushing Rolls, 16x10, 20x14, 36x16 Sturtevant; 30x10 Colorado Iron Works; 36x16, 42x16 Allis Chalmers; 36x16, 42x16 Traylor.
3—4x10, 5x10 Allis Chalmers Rod Mills.
12—6″, 8″, 10″ Dayton Dowd Centrifugal Pumps, all 3-stage, with 200 and 400 H.P. A.C. motors.
1—8′x12′ Oliver Rotary Continuous Filter.
1—24″x72″ Magnetic Pulley, complete.
10—Hardinge Ball Mills, 3′x8″, 4½x16, 5x22, 6x22, 6x36, 7x36, 8x22, 8x30, 8x48, 8x72.

Send for latest Consolidated News listing all sizes, types Jaw, Gyratory and Roll Crushers, Rotary and Vibrating Screens, Air Compressors, Swing Hammer Mills, Elevators, Conveyors, Rotary Kilns and Dryers, Ball, Rod and Tube Mills; Hardinge Ball and Pebble Mills; Raymond and other fine Pulverizers, Air Classifiers, Thickeners, Wet Classifiers, Filter Presses, Continuous Filters, Shovels and Cranes, etc.

Note: *Send for Illustrated Bulletin of Liquidation of Georgia Manganese & Iron Co. plant, Cartersville, Georgia. Refer to half-page ad in February issue.*

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Shops and Yards at
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READY for SHIPMENT

30″ McCully Gyratory Crusher AC Motor.
16″ Telsmith Gyratory Crusher AC Motor.
3-F Telsmith Gyratory Reduction Crusher.
10x20, 11x36, 24x36 Jaw Crushers.
2′, 3′, 4′, 5½′ Symons Cone Crusher.
5—Roller Raymond High and Low Side Mills.
36″ and 42″ American Ring Pulverizers.
No. 3 Gruendler Monster Hammer Mill.
No. 0 Bartlett & Snow Cyclo Pulverizer.
5′x11′ Marcy Rod Mill; 3½′x4′ Ball Mill.
80″x45′ Rotary Dryer, Indirect Heat type.
84″x70′, 56″x40′ Direct Heat Rotary Dryers.
5—48″x15′ Hot Air Rotary Dryers.
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9x8, 10x10, 12x10, 14x12 Ingersoll-Rand type ER-1 Belted Compressors.
446′, 600′, 732′, 900′, 1100′, 1300′, 1725′, 2200′, 2-Stage Belted & Direct Motor Driven Compressors.
110′, 250′, 310′ Portable Compressors.
4″, 6″, 8″, 10″, 12″, 15″, 16″, 18″, 20″ Sand and Gravel Dredge Pumps.
2″ to 42″ Centrifugal Pumps, Belt and Motor.
¾, 1, 1½ and 2 Yard Sauerman Cableway Outfits.
½, ¾, 1, 1¼, 1½, 2, 4, 6 Yard Sauerman Drag Scraper Outfits. Also extra Buckets.
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6, 8, 10 Ton Tandem Gasoline Rollers.
10x6x12 Gardner Duplex Steam Pump, OCP.
6 and 10x5x10 Duplex OEP Pot Valve Pattern Pump.
180 HP, F-M, type Y-VA, Full Diesel Eng.
150 HP, Maybach, 6-Cyl. Diesel, Reversing Gear.
20, 35, 60, 80, 100, 120, 200 HP Gasoline Engs.
20 HP Novo Single Drum Gasoline Hoist.
100 HP Thomas Double Drum Electric Hoist.
4—8¼x10, 2 and 3 Drum Steam Hoists.
3—24″x60′ Portable Belt Conveyors.
Nos. 7, 9B2, 9B3, 11B2 McK-T Pile Hammers.
Nos. 1, 2, and Size G Vulcan Pile Hammers.
⅛, ½, ¾, 1, 1¼, 1½, 2 Yard Clamshells.
7—50B Bucyrus Shovels and Dragline.
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One 40-ton Baldwin 4-wheel saddle tank.
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Birmingham, Alabama

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JAW CRUSHERS—7″x11″ - 8″x14″ - 9″x15″ - 10″x16″-6″x20″ - 11″x22″ - 12″x24″ - 13″x30″ - 15″x30″ - 18″x30″-18″x36″ - 20″x50″ - 28″x36″ - 30″x30″ - 26″x42″ - 36″x48″-42″x60″-42″x48″.
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Gyratory Crushers—From No. 2 up to No. 12.
No. 0-No. 1 and No. 2 ring roll mill.
No. 1—No. 1½ and No. 2 rotary fine crushers.
Swing hammer mills.
3′x25′-4′x30′-5′x50′-5½′x40′-6′x50′ direct heat rotary dryers.
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Indirect heat and steam heated air rotary dryers.
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Tube mills from 4′ to 7′ in diameter.
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Complete asphalt mixing and drying plants.

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3—Jaw Crushers 10x7″, 24x12″, 30x60″.
2—Sturtevant No. 1, No. 1½ Rotary Fine Crushers.
1—Sturtevant No. 1 Ring Roll Mill.
4—Gates Gyratory Crushers No. 3D, No. 6D.
5—Traylor Crushing Rolls, 42x18″, 36x16″.
3—Raymond Mills, two roll, four roll, five roll.
6—No. 0000, No. 00, No. 1 Raymond Mills.
2—Rod Mills 5x10′, 4x10′.
2—12″ Traylor Bulldog Gyratory Crushers.
1—Symons 7′ Cone Crusher.
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Reliance 8x14 Fine Jaw Crusher
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Sauerman 100′ Mast, 1-yd. Slackline Bucket
Gardner 12x14x12 Steam Air Compressor
Schramm 6x6 Duplex Belted Air Compressor
Westinghouse 10½ CC Compound Steam Air Compressor
Belt Conveyor, 24″ wide trough, 20′ long
Belt Conveyor, 20″ wide trough, 125′ long
Belt Conveyor, 22″x120′, new 6-ply belt
Leahy 3-deck Vibrating 3x6′ Screen
Morris 8″ Belt Driven Sand Pump
Ingersoll-Rand No. 50 Leyner Drill Sharpener
Goulds 8x6″ Centrifugal Pump, A.C. Electric
Steel Derrick Boom, 75′, in 3 sections
Portable Track, Cars, Locomotives, Dragline Hoists, Clamshell Buckets, Conveyor Equipment, Belt, and Truck Scales.

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Erie ¾ Yd. Steam Shovel on Cats.
8 Ton Plymouth Std. Ga. Gas Locomotive.
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19 Easton 4 Yd. End Dump 48″ Ga. Quarry Cars.
5″ High Pressure Pump.
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19 K & J 16 Yd. Std. Ga. Air Dump Cars.
2 Late Type Jordan Air Operated Spreaders.
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856′ Sullivan Ang. Cpd. Air Compressor with 152 Hp. 220 V. A.C. Motor Belted.
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BROWN HOIST
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10 Inch and 8 Inch McCully Superior Crushers.
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42x40 Superior Jaw Crusher.
5½ Ft. Symons Cone Crusher.
15-N Allis Chalmers 30x103 Gy. Crusher.
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Kennedy Type 37 Fine Reduction Crusher.
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Parts for No. 9K Gates Crusher
1 Shaft with Manganese Mantle.
1 Set Manganese Concaves.
1 Eccentric with gear attached.
Practically good as new at your price.
Also miscellaneous parts for No. 6K Gates Crusher.
These machines are being dismantled now.

If interested inquire—

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Bushings—Spacers—Tubes —Sleeves Straight or V Seam For Light and Heavy Machinery. If a Split Tube will do (it probably will)

Tell us how it is used, and we can make it.

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1½, 1⅜, 1¼, 1⅛ and 1″ IMPROVED PLOW STEEL and PLOW STEEL, lengths 300 to 3000 ft.; especially adapted for DREDGING, DRAG LINES, Hoisting, SLINGS, Cableways and etc.; 60,000 ft. 1 and ⅞ Extra Strong, for GUYS and etc.; LOW PRICES; slightly used but practically NEW; Address **PHOENIX CONTRACT CO.**, Winne Building, WICHITA, KANSAS.

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1—Sauerman D. D. Dragline Hoist with 180 HP motor complete.
1—42″ x 19′ Revolving Screen complete with motor.
1—2-yd. Sauerman Slackline Bucket.

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FOR SALE—A Good Time to Buy
Shovel—Marion 490 Elec. Bucyrus 50B Dies.
Crusher—Gyr. McCully 42 double discharge enough spares for 2nd machine
Crusher Plant 18″ gyr. elev.—screens—conveyors
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10″ H. & B. Gravel Pump, good condition. Thomas two speed electric hoist and 1¼ cu. yd. Sauerman Slackline complete. ½ yd. Sauerman Slackline complete. 10-ton Holt Cat., Adams 12′ Grader. 4 Baker 1 yd. Mannies, good condition.

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20-Ton Steel Stiff Leg Derrick, 90′ Boom.
24x36″ Farrell 15-B Jaw Crusher.
9x10 and 10x12″ 2 and 3-Drum Steam Hoists.
60 HP 3-drum and Swinger American Gas Hoist.
All other sizes, also Compressors, Diesel and Steam Engines, Cranes, Shovels, Locomotives, Cars, Boilers, Motors, Generators, Rail, Tanks, Pipe.

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A Roller Bearing Reduction Crusher, 9″x21″ Jam Crusher preferred. Address

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One (1) General Crane, 30′ boom, #1442.
One (1) Link Belt Crane K-25, 40′ boom, #1541.
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All three machines guaranteed to be in perfect mechanical condition.

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Marion Gas-Electric ¾ yard Shovel.
Osgood 1-yard gas crawler shovel, overhauled.
Locomotives: 75-ton switcher code boiler; also saddle tank type, narrow and standard gauge.
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5 to 30-yd. Side Dump Cars.
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Portable and stationary, belt, with elec. or gas. power, sizes from 21 cu.ft. to 1000 cu.ft.

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246—Buckets, all sizes and makes.

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Large lot including std. ga. 6 and 12-yd. and 20-yd., 36-ga. 5 yd. and 24-ga. 1½-yd. Also std. ga. flat cars and ballast cars.
48—Koppel Quarry cars 42" ga. 2½ yd. One way side dump.

CONVEYORS and ELEVATORS
9—Port Belt Conveyors with steel frame, gas or elec. pr. 18 and 24 in. Barber Greene and Chic. Automatic.
3—Stationary: 1—Barber-Greene 24" x200', 1—Robbins 24"x200', 1—Barber-Greene 18"x100'.
11—Bucket elevators; 6 Chain Belt Co. and Weller and Link Belt vertical enclosed type; capacities from 35 to 117 tons per hour. 5—Weller inclined type Nos. 3, 4, 5 and 6 up to 170 yds. per hr.

CRANES (Locomotive)
5—Locomotive cranes; sta. ga. 30 and 25-tons; Ohio, Browning, American, Industrial.
1—American 15 ton gasoline powered locomotive crane on 8 wh. MCB trucks, 50 ft. boom. Model 158-G.

CRANES and DRAGLINES
1—Northwest No. 5, Ser. No. 3430, 50 ft. boom, 1¼-yd. dragline or clamshell; 130 HP 6 cyl. Wisconsin accelerated control engine.
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6—1-yd. gasoline crawler type cranes. Northwest, Link Belt, P & H, Brownhoist.
3—½-yd. Gasoline crawler cranes. Northwest, Brownhoist and Thew.

DERRICKS
Steel and wood, stiff leg, or guy; from 5 to 50 tons, including 3 steel stiff legs; 1—20-ton Terry 100 ft. boom; 1—10-ton Insley 80 ft. boom and 1—10-ton American, 80 ft. boom.

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Gasoline, electric and steam. All sizes.

LOCOMOTIVES
32—Gasoline locomotives from 14-ton to 2-ton, std. 36 and 24-ga.
1—3 ton 42" ga. Fordson.
1—24-ton Porter steam, saddle tank, cyl. 12"x16" st. ga. Serial No. 5093.

PUMPS
All sizes and types, both force, centrifugal and steam.

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1—Model "00" Thew crawler mounted gas shovel with ½-yd. dipper. Also Link Belt Shovel attachment for Models K-55, K-44, K-42, K-38 or K-2.

TANKS
4—Link Belt sand separators—2 size 72", 2 size 60".

CRUSHERS AND SCREENS

1—Symons coarse cone crusher, size No. 5½, SU No. 521; capacity 450 tons per hour of 2½" material—130 tons per hour of ½" material; weight 85,000 lbs.
1—Set Power and Mining Machinery Co. crushing rolls, size 42 in. x 16 in., rated capacity 15-20 tons per hour of ⅜" material; weight 41,000 lbs.
1—24"x36" Farrell Jaw Crusher in first class condition—Wt. 41,000 lbs.
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2—No. 3 McCulley gyratory crushers; size of each opening 7"x28"; capacity 25 tons per hour of 2¾" material; 11 tons per hour of 1¼" material; weight 17,000 lbs.

SCREENS
2—Allis Chalmers roller type, all steel, heavy duty, 48 in. dia. by 24 ft. long screen in 3 sections.
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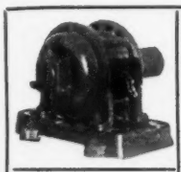

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Type C. Size 56"x72"

Good Condition

SAFE HARBOR WATER POWER CORP.

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1—25 ton Ohio Loco. Crane, 50' boom. ASME boiler.
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1—Marion 1 yd. Steam Crane, 40' boom, on cats.
1—Marion 15 ton Gas Crane, 40' boom, fairleads.
1—Link-Belt K-2 Crane, 40' boom, 15 ton capacity.
1—Browning ⅝ yd. Shovel, 35' crane boom.
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1—Keystone one yard Skimmer and Trench Hoe Att.
2—Universal 7½ ton Truck Cranes.
1—Lambert 3 drum Gas Hoist with Swinger, Buda gas eng.
1—60 HP Johnson locomotive type Boiler.
2—Caterpillar 60's with Bulldozers.
1—Sullivan 310' portable gas Compressor.
1—Chgo. Pneu. 220' portable gas Compressor.
2—Ingersoll-Rand 220' portable air Compressors.
6—Ingersoll-Rand Rock Drills.
2—1 yd. Insley Bottom Dump Concrete Buckets.
1—1 yd. Steubner bottom dump Concrete Bucket.
1—1 yd. Page Dragline Bucket.
1—1 yd. Blaw-Knox Clamshell Bucket.
2—1 yd. Hayward Clamshell Buckets.
1—¼ yd. Hayward Orange Peel Bucket.
1—⅝ yd. Browning Clamshell Bucket.
1—⅝ yd. Kiesler Digging Bucket.
1—⅝ yd. Owen Digging Bucket.
1—Morris 8" Dredge Pump with 150 HP G.E. motor.
1—Morris 10" Cent. Pump 2250 GPM@130' head.
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1—Amer WellWks6x8" Cent. Pump20HP West.motor
1—Thompson6" Self Priming Pump, Waukesha motor.
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2—Domestic 4" Self Priming Pumps.
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2—No. 7 McKiernan-Terry Hammers.
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Hp.	Type	Speed
800	G. E. sl. rg.	720
600	G. E. syn.	860
2-600	G. E. sl. rg.	252
600	G. E. syn.	257
600	Al. Ch. syn.	240
3-675	Al. Ch. syn.	900
400	West. sl. rg.	514
400	Al. Ch. syn.	300
300	Al. Ch. sl. rg.	585
260	Al. Ch. syn.	720
250	West. sl. rg.	720
200	G. E. sl. rg.	1200
200	West. sl. rg.	500
200	F. M. sl. rg.	600
150	G. E. sl. rg.	1750
150	G. E. sq. c.	1750
100	Cr. Wh. syn.	225

ENGINE GENER.
1-400 kva., Cr. Wh., 240 v., 3 ph., 60 cy., 120 r.p.m. to Hamilton Corliss Engine.

MOTOR GENER.
1-750 kw. G. E. MPC., 250 v., D.C. Gener. to 1100 hp. G. E., ATI, synch. motor, 2200-3-60-900 r.p.m.

CENTRIF. PUMPS
3-14,000 G.P.M., 150' Head dir. conn., 675 hp. Al. Ch. 900 r.p.m. syn. motors.
1-14,000 G.P.M., 60' Hd., dir. conn. 260 hp., Al. Ch. 720 r.p.m.

Above are a few of our stock items.

BELYEA CO., INC.
153 W. 18TH ST., NEW YORK CITY
REBUILT GUARANTEED

FOR SALE

2—3½ ton 36" ga. Plymouth Gas Locomotives.
12—5 yd. 36" ga. Western Dump Cars.
6—2 yd. 36" ga. Koppel Steel V-shape Cars.
4—1½ yd. 36" ga. Insley V-shape Dump Cars.
23—12 yd. Western 2-way Air or Hand Dump Cars.
4—50 ton 41 ft. Steel Flat Cars.
26—50 ton Center Dump Gondola Cars.
2—40 ton Baldwin S.T. Locomotives, 14x22 cyls.
Rails—First-Class Relaying Rails, 60, 70, 80, 85, 90 and 100 Lb. Rails and Bars, Tie Plates, Spikes, Switches.

HYMAN-MICHAELS CO.
20 N. Wacker Dr. Bldg. CHICAGO, ILL.
Railway Exchange Bldg. ST. LOUIS, MO.

NEW DIESEL ENGINES

At One-Half Price

5—135-hp. Atlas Imperial Diesel, 6-cyl.
1—125-hp. Victor Diesel, 2 cyl.
2—90-hp. Atlas Imperial Diesel, 4-cyl.
1—85-hp. Victor Diesel.
1—65-hp. Victor Diesel.
1—45-hp. Atlas Imperial Diesel, 3-cyl.

JOHN REINER & CO., Inc.
29 Howard St., New York City
Canal 6-0785

For Sale

1—No. 7½ McCully Crusher.
1—No. 6 Smith Crusher.
1—No. 5 Austin Crusher.
1—10" Superior McCully Crusher.
1—8" Traylor Crusher.
2—No. 3 Gates Crushers.
1—6" Superior McCully Reduction Crusher.
1—48" Symons Horizontal Disc Crusher.
Several Jaw Crushers.
Gas and Electric Motors, 1 HP to 200 HP.
1—Clipper Well Drill.
1—Clyde 2 Drum Hoist, built for 2 Yd. Drag Scraper, with or without motor.
2—Complete Gravel Washing Plants.

LIPPMANN ENGINEERING WORKS
4603 W. Mitchell St. Milwaukee, Wis.

FOR SALE

Sauerman Bros. Complete Cableway

One—1 yd. bucket, 80 ft. steel mast, 80 H.P. two speed electric hoist, Telsmith Settling tanks, etc. Excellent condition. Real bargain.

JOHN JONES & SONS GRAVEL CO.
Indianapolis, Ind.

BARGAINS

Thomas 12" x 14" Steam Hoist
Double Drum Without Boiler

Thomas 100 Hp. 2-Speed
Electric Slackline Cableway Hoist

Thomas 150 Hp. Electric
Special D. D. Scraper Hoist

Also All Types Single, Double, Three Drum Hoists—Electric, Steam, Gasoline.

Thomas Hoist Company
20 S. Hoyne Avenue CHICAGO

WE BUY USED ELECTRICAL EQUIPMENT

A.C. AND D.C. MOTORS, GENERATORS, TRANSFORMERS, CIRCUIT BREAKERS, METERS, ETC.

SEND US A LIST OF YOUR IDLE OR SURPLUS ELECTRICAL EQUIPMENT.

THE FUERST-FRIEDMAN CO.
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Used Bulldog 5-ton Mack Parts for sale. Cheap.

H. S. SHAFER CONSTRUCTION CO.
Nazareth, Pa.

FOR SALE

Link Belt Shaw Classifiers

4—24 inch
2—30 inch
2—36 inch

Priced reasonable for quick sale.

Terre Haute Gravel Co., Terre Haute, Ind.

COMPLETE HYDRAULIC DREDGES

SAND AND GRAVEL DREDGING PUMPS
AGITATING MACHINERY
DREDGE HOISTS
STEEL HULLS • PONTOONS
PIPE LINE ACCESSORIES

HETHERINGTON & BERNER, INC.
701-745 KENTUCKY AVENUE .. .. INDIANAPOLIS, IND.

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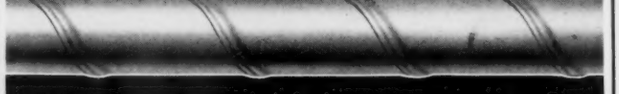
TAYLOR



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Stronger gauge for gauge than any other type. Light weight. Low initial cost. Easy to handle or move. Stout and rigid. Smooth, full-flow interior. Available in steel or Armco Ingot Iron. Write for Catalog.

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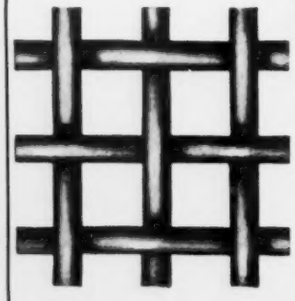

DURO SCREENS
Tough and Economical

Made of a special Spring Steel Wire to resist extreme abrasion and withstand severe vibration.

Write for Bulletin 110

ESTABLISHED 1884

F. P. SMITH
WIRE AND IRON WORKS
Clybourn, Fullerton and Ashland Aves. and Chester St., CHICAGO

VARIABLE Circle-Throw

The Jigger tops all screens for grading efficiency — for it's the only screen with *controlled vibration*, adjustable to suit material. Every square inch of cloth is kept as busy as a top with *circle throw action* insuring higher recovery, closer grading, lower costs.

Self-Centering Stabilizers
Self-Aligning Housings
Soft Shoe Mountings
Oil Lubrication

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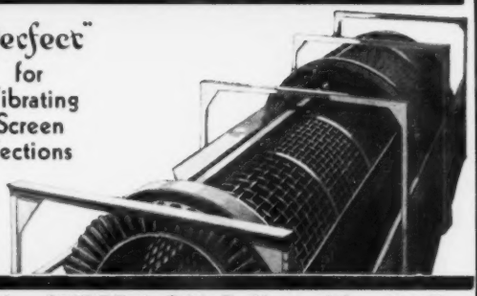
"The Perfect" SUPER-LOY WOVEN WIRE SCREENS

"Perfect" for Vibrating Screen Sections



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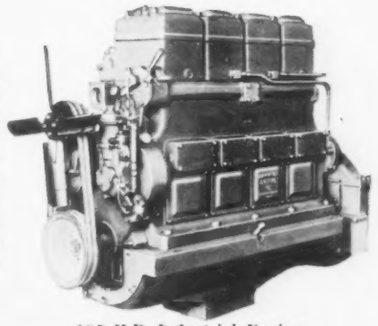
"IT PAYS TO BE DIESEL-WISE"

REPLACE

costly gasoline power with economical, efficient

CUMMINS DIESEL ENGINES

Cut your power costs—speed up your operations—with CUMMINS Diesel Engines. A complete line from 35 H.P. to 200 H.P.—for motor trucks, portable power equipment and stationary power applications. Write today for complete facts. Please list your present gasoline-powered equipment.



105 H.P. Industrial Engine

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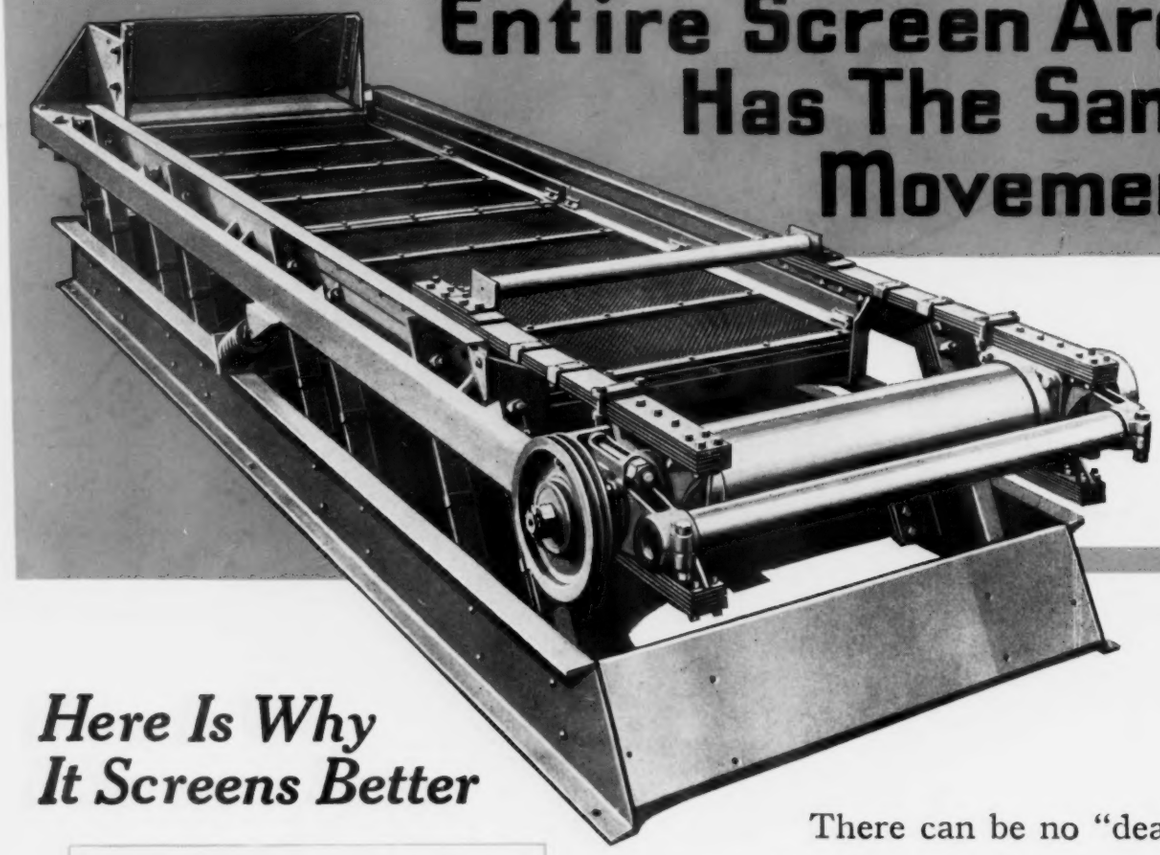
—The Leader in Diesel Engineering Advancement

SALES AND SERVICE FROM COAST TO COAST

SYMONS SCREEN

Entire Screen Area Has The Same Movement



Here Is Why It Screens Better

- Sets level.
- Saves headroom.
- Easily installed.
- Has automatic feed.
- All bearings dust tight.
- Weight of screen deck not carried on bearings.
- All vibrating parts are counterbalanced.
- No grinding action between material and cloth. Life of cloth greatly lengthened.
- Readily enclosed in dust tight housing, with all bearings and motor outside of dust housing.

There can be no "dead" spots on the Symons Screen. The manner in which the screen deck is supported and actuated makes the entire screen area have the same movement. The travel of material along the deck is rapid and uniform. With the screen set level and with its unusual screening action, closer sizing, quicker stratification and removal of undersize is secured.

Described in Bulletin TU65

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